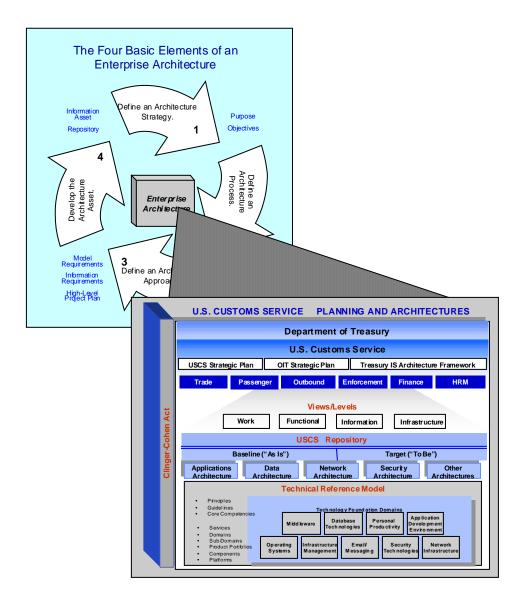
#### **US Customs Service**

# Enterprise Architecture Blueprint



August 1999

Department of The Treasury United States Customs Service

Office of Information & Technology Technology and Architecture Group

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**FOREWORD** 

The United States Customs Service (Customs) has developed the Customs Enterprise Architecture framework in accordance with both the Treasury Information Systems Architecture framework (TISAF) and the CIO Council Federal Enterprise Architecture framework. The framework provides a structure for organizing Customs resources, and for defining and managing Customs enterprise architecture activities.

Customs has recently amended the Investment Management Process (IMP) to ensure that all Information Technology (IT)-related projects are approved and managed based on Customs business requirements, and have accountable sponsorship. In order to effectively support this process, Customs must have a clear picture of its current business enterprise, a plan for its strategic direction and the information assets to manage the transition from its current state to its future state(s).

Customs has completed an effort to characterize a baseline and key target future-state representations of the business and technical architecture views based on the Customs Enterprise Architecture framework. While the target views for the Trade Compliance and Human Resources Management business process areas have been developed from the existing to be process definitions produced by each area's business process improvement (BPI) effort, the target states for the remaining process areas reflect a mirror image of their baseline operations. As each of the other process areas continue to redefine their future states, the appropriate target representations in the architecture repository will be modified to reflect the new vision and architecture views. The information captured in these views is intended to equip the IT-planners and IT-owners with necessary resources to ensure that decisions are aligned with the business and technology strategies of Customs.

This blueprint presents the Customs Enterprise Architecture as the combination of four basic elements: an architecture strategy, a set of processes, modeling approaches and the construction of a strategic information asset base. The actual collection of baseline and target information describing each process, application and infrastructure components is contained in the asset base which combines the models and data stored in the enterprise architecture repository database with the collection of visual models maintained as distinct files by the technical architecture group (TAG).

By presenting the Enterprise Architecture as the combination of the four basic elements, Customs demonstrates that establishing an enterprise architecture management capability is not simply the publication of a set of diagrams and standards; rather, it is a continuous cycle that can adapt to changing environments while ensuring that it stays aligned with the mission of the Agency.

S.W. Hall, Jr. Assistant Commissioner Office of Information Technology

**INTRODUCTION** 

#### A.1. U.S Customs Mission Statement and Objectives

#### A.1.a. Mission Statement

We are the guardian of our Nation's borders—America's frontline. We serve and protect the American public with integrity, innovation and pride. We enforce the laws of the United States, safeguard the revenue and foster lawful international trade and travel.

#### A.1.b. Objectives

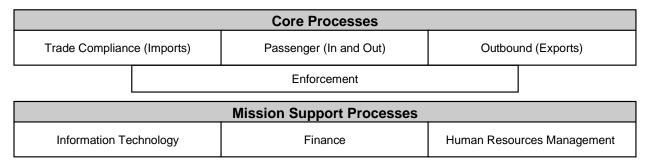
The objectives of U.S. Customs (Customs) for the next five to 10 years are to:

- Implement enforcement strategies resulting in effective interventions against willful violators
- Strive to achieve 100 percent compliance with the laws of Customs and other agencies
- Form partnerships with other agencies and industries to provide world-class customer service
- Become an information-based agency that maximizes the use of technology to achieve mission effectiveness and resource efficiency
- Create a working environment that best utilizes and recognizes the talents of its employees.

#### A.2. CUSTOMS STRATEGY

#### A.2.a. Strategy

To achieve its objectives and meet its challenges, Customs adopted the concept of Business Process Improvement (BPI). The execution of a BPI provides the catalyst for a target architecture. Along with BPI, U.S. Customs also used the concept of Strategic Problem Solving (SPS) to improve the narcotics, money laundering and trade enforcement efforts. The executive management of Customs has identified four core process areas and three mission support process areas as shown below:



**Figure 1: Customs Process Areas** 

Customs has assigned process owners to each of the processes to ensure accountability. Process owners develop the boundaries of their process fully, the linkages with the other processes, the processing standards, measures, etc., to better serve the internal and external customers of each process. They are responsible for identifying, developing and initiating changes to their processes. They also ensure that the changes are fully coordinated with the functional managers responsible for implementing them and with the customers and stakeholders of the processes. The process owners have formulated a series of strategic goals and measures to gauge their success which is reflected in the U.S. Customs Service Strategic Plan.

#### A.3. CUSTOMS FUTURE ENVIRONMENT

#### A.3.a. Future Environment

Customs is on the front lines in the battle to stem the tide of narcotics being smuggled into the United States through an ever-changing kaleidoscope of methods. It is also an intermediary in a global trading system that continues to expand and rapidly change as trade barriers are lowered, bilateral and trilateral agreements are reached, free trade zones are created and developing nations continue to industrialize. These external changes coupled with an austere fiscal climate, growing pressure for reduced government, continuing demands by the public for greater accountability, efficiency and effectiveness, and demands by our direct customers for increased customer service provide a set of unique challenges for the Customs to meet as it enters the next century. To meet these challenges, Customs has set out an ambitious agenda to reinvent the way it does its work.

This agenda requires Customs to improve the way it defines, budgets, deploys and maintains information technology (IT). Specifically, IT-related projects need to be approved and managed based on Customs business requirements and have accountable sponsorship. In order to effectively accomplish this, Customs needs to have a clear picture of its current business enterprise, a plan for its strategic direction and the tools to manage the transition from its current state to its future state(s). The current questions being addressed by Customs are:

- How do the different entities that comprise Customs business enterprise relate and interact with each other?
- What is Customs future state(s) and what IT will need to be in place to support it?
- What business tools does Customs need to have in place to effectively define, budget, deploy and maintain IT projects as it transitions to its future state(s)?

#### A.4. Office of Information and Technology (OIT)

#### A.4.a. Responsibilities

- The Office of Information and Technology (OIT) is responsible for the design, development, programming, testing, implementation and maintenance of Customs automated information systems, and for overseeing and managing the research and development and communications functions of the Customs.
- OIT is responsible for management of all Customs computer facilities, hardware, software, data and voice telecommunications, and related financial resources.
- OIT is further responsible for:
  - Identifying and evaluating new technologies for application to Customs automated systems
  - Developing and maintaining all operational aspects of the Customs Computer Security Program
  - Establishing requirements for computer-to-computer interfaces between Customs and various trade groups and government agencies
  - Representing Customs on matters related to automated import processing and systems development
  - Implementing a viable information resources management (IRM) program.

#### A.5. OIT'S MISSION AND STRATEGIC OBJECTIVES

#### A.5.a. Mission

To maximize the use of information and technology to enhance productivity, support business processes and meet the challenges of the Customs mission in accordance with the principles outlined in the Clinger/Cohen Act.

#### A.5.b. Strategic Objectives

- A. Develop and maintain systems to support the business growth and insert new technologies and processes to improve systems performance.
- B. Utilize the Customs Enterprise Architecture, Investment Management Process and Process Improvement Plans to reduce risk and align IT with business requirements.
- C. Define and deploy a modern, secure IT infrastructure to improve performance of business systems and meet future business demands.
- D. Provide the applied technology systems and infrastructure to support the business processes and enforcement systems goals and objectives.

Objective B enforces the strategic value that has been placed on the development and use of the enterprise architecture in aligning IT with the business.

#### A.6. ENTERPRISE ARCHITECTURE LINKAGE TO THE STRATEGIC OBJECTIVES

#### A.6.a. Strategic Objective

Utilize the Customs Enterprise Architecture, Investment Management Process and Process Improvement Plans to reduce risk and align IT with business requirements.

#### A.6.b. Enterprise Architecture

#### 1. Utilize the Customs Enterprise Architecture (EA)

Utilize the Customs EA and IMP to align solutions development with Customs business processes and provide a standardized technology environment.

- Utilize the Customs EA to ensure Customs has a clear picture of its current business enterprise, a plan for its strategic direction and the information assets to manage the transition from its current state to future state.
- Continue to update the Customs EA as business processes change and use it to evaluate projects in order to reduce risk, achieve alignment with

business process needs and eliminate stove-piped data, technology and systems.

- Replace systems which do not align with the business processes or Customs EA (e.g., replace World-Wide Alien Narcotics Trafficking System (WANTS) with ATS/Passenger).
- Demonstrate that the Customs EA is managed for continuous improvement in order to adapt to changing environments while ensuring that its stays aligned with the mission of the Bureau.
- Educate process owners, users and technologists concerning the Customs EA.

#### 2. Utilize the Investment Management Process (IMP)

Utilize the IMP to manage IT resources as investments.

- Continue to implement, utilize and refine the Customs IMP to select, control
  and evaluate the Customs portfolio of initiatives in order to reduce risk,
  achieve alignment with the business process needs and eliminate stovepiped data, technology and systems.
- Continue to integrate the planning, budgeting and scoping processes into the Customs IMP.
- Educate process owners, users and technologists concerning the IMP.

#### 3. Institutionalize Process Improvement

Institutionalize Process Improvement into the Customs IT environment.

- Continue to implement, utilize and refine mature enterprise IT processes and life cycles which respond to Customs needs, oversight requirements and industry best practices.
- Educate process owners, users and technologists concerning process improvement and industry best practices.

#### 4. Support building a training program

Support the Treasury Department in building and refining an infrastructure to improve IT and non-IT workforce skills. Provide a comprehensive, investment approach to improving skill bases and expanding opportunities for development as well as attracting a high performance workforce with the right skills.

#### **5. Develop the OIT Program Monitoring Process**

Develop a program monitoring process which ensures that management has sufficient visibility into the information automation and technology projects so that managers can make informed and timely project decisions. This is to include the development, monitoring and maintenance of master schedules and summaries which will highlight milestones and activities. Ensure that the

programs are compliant with the OIT policies, processes and procedures through the use of audit trails and performance audits.

#### A.7. ENTERPRISE ARCHITECTURE OVERVIEW

#### A.7.a. Definition of an Enterprise Architecture

An EA is a strategic information asset base which defines the *mission*, the *information* necessary to perform the mission, the *technologies* necessary to perform the mission and the *transitional* processes for implementing new technologies in response to the *changing* needs of the mission.

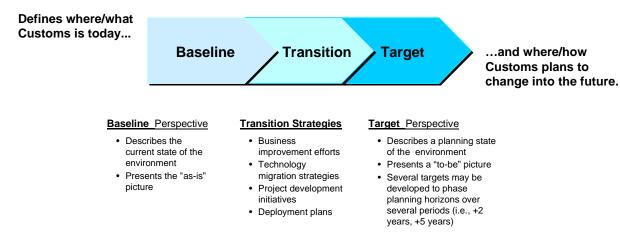


Figure 2: Definition of an EA

#### A.7.b. Benefits of an Enterprise Architecture

An Enterprise Architecture (EA):

- Captures facts about the business in an understandable manner to enable better decision-making
- Improves communication between the IT organization and the business units
- Reduces the risk of building systems that do not meet business needs
- Eliminates false starts
- IRB decision support tool used in IMP
- Highlights opportunities for building greater quality and flexibility into applications without increasing the cost.

The broader the scope of the architecture across the enterprise and the deeper its levels of detail, the greater the potential benefit.

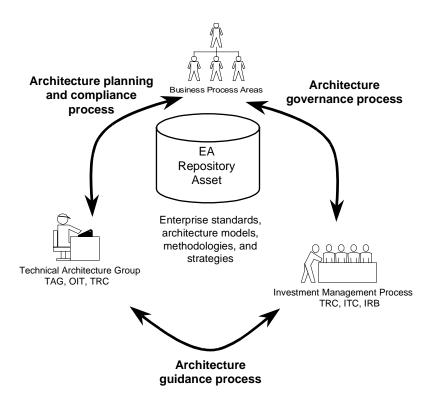


Figure 3: Benefits of an EA

# 10-year costs of 43 redundant application programs & files \$171,500 \$171,500 \$1,000,000 \$2,000,000 \$3,000,000 \$4,000,000 \$5,000,000

#### A.7.c. Cost Comparison of Redundant vs. Architected Systems

Figure 4: Comparison of Redundant vs. Architected Systems

Source: Larry English, copyright 1999 INFORMATIONIMPACT.

#### Includes:

- Double cost to model data across enterprise
- Double cost to build shared application
- Double cost of operating a single shared database compared with 43 individual redundant applications
- 40% wage increase to information producer because of higher value of work

# REDUNDANT SYSTEMS APPROACH VERSUS RESOURCE APPROACH DEVELOPMENT COSTS

Systems Approach:						
43 Different programs to create 1 fact in						
43 different databases *						
Cost of 1 program (over life)		\$20,000	43	\$860,000		
Cost of 1 table (over life)		\$12,000	43	\$516,000		
Total development/maintainance						\$1,376,000
expenses						\$1,370,000
Data entry 1 person per year x 1/4 time	\$25,000	\$6,250	43	\$268,750		
IT Operation cost per year		\$1,000	43	\$43,000		
(1 program + 1 database)		ψ1,000	40	Ψ40,000		
Total operational expenses				\$311,750	10	\$3,117,500
10 Year Total Cost						\$4,493,500
Resource Approach:						
Cost of 1 enterprise program *		\$40,000	1	\$40,000		
Cost of 1 enterprise database file*		\$24,000	1	\$24,000		
Total development expenses						\$64,000
Data entry 1 person per year x 1/4 time	\$35,000	\$8,750	1	\$8,750		
IT Operation cost per year		<b>#0.000</b>	4	Ф0.000		
(1 program + 1 database)		\$2,000	1	\$2,000		
Total operational expenses				\$10,750	10	\$107,500
10 Year Total Cost						\$171,500

<sup>\*</sup>Assumes 2 times the amount of time to define requirements for all consensus vs. one functional unit

Source: Larry English, copyright 1999 INFORMATION IMPACT.

#### A.8. Customs Enterprise Architecture Framework

The Customs EA framework provides a structure for organizing resources and for defining and managing enterprise architecture activities. The development and maintenance of an architecture is a continuing process of evaluating current conditions and seeking target solutions. The TISAF compliant views within the framework are work, functional, information and infrastructure. Typical architecture segments captured in the framework include data, applications, technical and security. The key linkages established within the framework are from the business processes to application systems and application systems to the technology infrastructure.

#### **U.S. CUSTOMS SERVICE** PLANNING AND ARCHITECTURES **Department of Treasury U.S. Customs Service Treasury IS Architecture Framework USCS Strategic Plan OIT Strategic Plan Passenger Outbound Enforcement Finance** HRM **Trade** Views/Levels Work **Functional** Information Infrastructure Clinger-Cohen Act **USCS** Repository Baseline ("As Is") Target ("To Be") Applications Network Security Other **Data Architecture** Architecture Architecture Architectures Architecture **Technical Reference Model** Principles **Technology Foundation Domains** Guidelines Core Competencies Development Environment Technologie Productivity Services **Domains** Sub-Domains Operating Systems **Product Portfolios** Components Platforms

Figure 5: Customs EA Framework

#### A.9. Customs Enterprise Architecture Methodology

The four basic elements to building an EA management capability include a strategy, processes, approaches and an information asset.

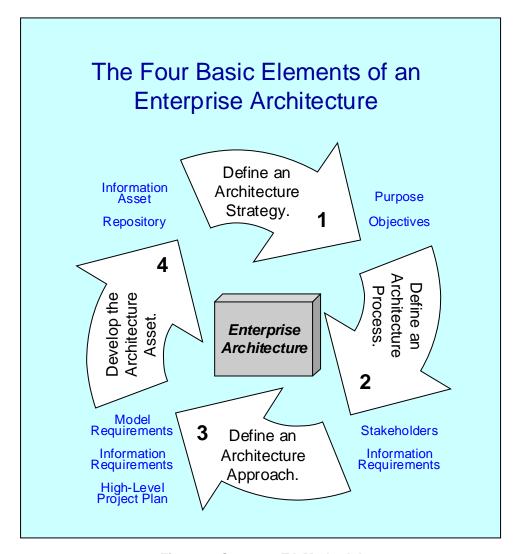


Figure 6: Customs EA Methodology

#### Key Issues:

- Strategy
  - Why do we need an architecture?
  - What are the problems we are trying to solve or control?
  - What are the principles and objectives for the architecture?

#### 2. Processes

- How we will manage the architecture?
- Who and how will people use the architecture?
- What type and form of information must the architecture provide?

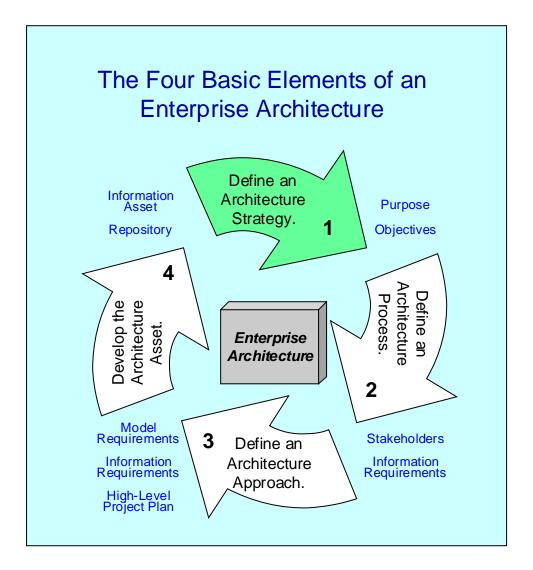
#### 3. Approaches

- Where can we collect that information? What will it take?
- How can we represent that information (methodologies/models)?
- How do we organize the models and information into a framework?
- To what level of depth do we need to model?

#### 4. Information Asset

- How do we populate the framework, models and information to create the information asset?
- How do we present the information in a usable form?
- How do we ensure that the architecture has done what it is intended to do?

# 1 ARCHITECTURE STRATEGY



#### Key Issues

- Why do we need an architecture?
- What are the problems we are trying to solve or control?
- What are the principles and objectives for the architecture?

#### 1.1 OVERVIEW

This section presents the basic strategy behind the establishment by Customs of the enterprise architecture (EA) as a strategic information asset. The architecture strategy exists as the collection of objectives, purposes/goals and major policies, principles and guidelines that is used to direct the development of the strategic information asset.

In the absence of an EA, an organization is challenged to make informed information technology (IT) investment decisions to reduce the layers of complexity it must manage.

The definition of the architecture strategy allows the key decision-makers to direct the development of the information asset to ensure it will provide the information, views and perspectives that they need to make better decisions. An effective EA enables the organization to guide the development, selection and proposal process, make better-informed IT investment decisions and control the evolution of the technology environment.

While the EA strategy was initially concentrated on the delivery of a TISAF-compliant architecture asset by the end of the 1998 fiscal year, it fell short of completely satisfying the Treasury and GAO recommendations relating to the implementation of processes and procedures to enforce compliance with the architecture. The many changes that have occurred inside Customs since that delivery have combined to extend and enhance the strategy to its current state that covers the previous shortcomings. These changes have included the continued refinement of the investment management process (IMP) process, the implementation of the technology review committee (TRC), the information technology committee (ITC) and investment review board (IRB) governance bodies, the staffing of the technical architecture group (TAG), the creation of a new technical reference model (TRM) and the development of the EA strategy, processes and approach.

Benefits enabled by having the EA include:

- Making sound technology investments that are in alignment with the business' needs
- Complying with Clinger-Cohen and TISAF requirements
- Guiding the development and proposal processes to reduce confusion and complexity
- Establishing a direction for the controlled evolution of the technology environment.

#### 1.2 CURRENT ASSESSMENT

The current assessment presents a snapshot of the accomplishments within the EA effort at Customs relating the development of the architecture strategy, objectives, principles and guidelines.

Prior to the initiation of the first development phase of the EA\* effort in April 1998, Customs had already conducted an e architecture effort (CDC-2000) and was beginning to rework its IT strategic planning and IT investment review processes based on the recommendations of that effort.

The architecture effort and information asset used the TISAF name Enterprise Information System Architecture (EISA) through the first three development phases (April-December 1998). In the fourth phase of the project, the name was reduced to the Enterprise Architecture (EA) to incorporate its expanded role and scope (i.e., application and data architectures, business models, processes and roles).

- Challenges facing Customs:
  - Current systems cannot effectively support implementation of new legislation mandates (i.e., origination of NCAP).
  - Congress and the Office of Management and Budget (OMB) have required CIOs to develop, maintain and facilitate integrated system architectures.
  - Major IT initiatives focused on modernizing systems are becoming more highly scrutinized prior to the release of funding because of the high-profile recent failures (i.e., IRS tax system, FAA air traffic control system).
- Customs was the first agency to develop and implement an architecture under the TISAF requirements issued in January 1997.
- CDC-2000 and Customs IT strategy projects (January–July 1997)
  - The strategy was focused on improving Customs IT effectiveness (people, processes, organization and technology) and determining both the business drivers and requirements necessary to guide the Customs IT initiatives in the future.
  - These two efforts were insufficient to satisfy Treasury's and GAO's requirements to deliver a complete Customs EA and implement the appropriate architecture enforcement and management processes.
- The EA strategy for the first three development phases was focused on the delivery of a TISAF-compliant architecture asset by the 1998 fiscal year-end deadline in accordance with the recommendations presented in the following documents:
  - GAO final report, issued May 1998, CUSTOMS SERVICE MODERNIZATION: Architecture Must Be Complete and Enforced to Effectively Build and Maintain Systems (GAO/AIMD-98-70).
  - U.S. Treasury architecture documents:
    - » Treasury Information System Architecture Framework (TISAF) Version 1.0 (3 January 1997)
    - » Treasury Architecture Development Guidance (TADG) Version 1.0 (3 January 1997)
    - » Treasury Architecture Development Process (TADP) Version 1.0 (30 September 1997).
  - Final report from IITRI contractor and Treasury Architecture Group (TAWG) team, Independent Review of the Customs IT Architecture (11 February 1998)
  - Release 1.0 of the Customs EISA was delivered in October 1998 and received the endorsement of the TAWG as demonstrating considerable and appropriate progress in developing an TISAF-compliant architecture.
- The initialization of the fourth phase of the development effort corresponded with the following key changes in the Customs OIT organization:

- The refinement of the IMP and SDLC processes: Select, Control, Evaluate
- The implementation of TRC, ITC and IRB governance roles.
- The charter and staffing of the TAG.
- The fourth phase has delivered the following key components:
  - The completion of the baseline perspective for all business processes and the capture of the target views for Human Resource Management and Trade Compliance.
  - The capture of the EA portfolio.
  - The renewal of all product strategies and technology standards within the TRM.
  - The development of the EA blueprint incorporating the strategy, processes, approach and architecture asset.
- The current strategic focus for the EA is to provide the planner's and owner's perspectives of both the baseline and the target business, application and technical environments.

#### 1.3 ENTERPRISE ARCHITECTURE SCENARIO

# Hypothetical Scenario: Introduction of a point solution at a work location facility

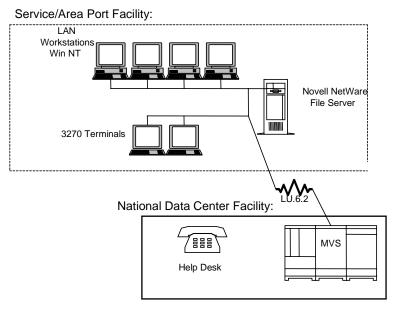


Figure 7: Hypothetical Work Location facility

#### Situation

A new mandate has been issued to the Passenger group to perform a new, specialized process on persons fitting a particular profile.

The Passenger Process team has determined that this capability cannot currently be supported by any of the fielded applications. As a result, the team has initiated a new tactical IT proposal/project to define, develop and deliver the required functionality under the time constraints of the mandate (i.e., ASAP).

#### **Typical Process**

Normal process that takes place without having a defined EA is shown in the figure below.

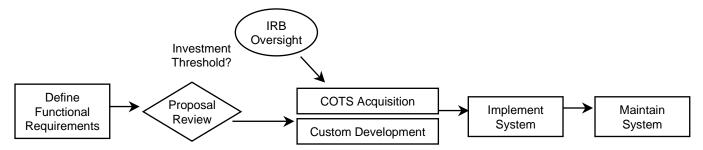


Figure 8: IT investment process without an EA

In the absence of an EA, the organization is challenged to make informed IT investment decisions to reduce the layers of complexity it must manage.

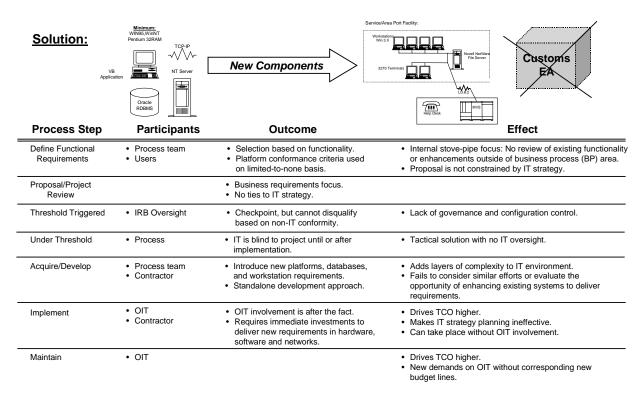


Figure 9: Solution in the absence of an EA

#### EA-Enabled Process:

An effective EA enables the organization to guide the development and proposal process, make better informed IT investment decisions and control the evolution of the technology environment.

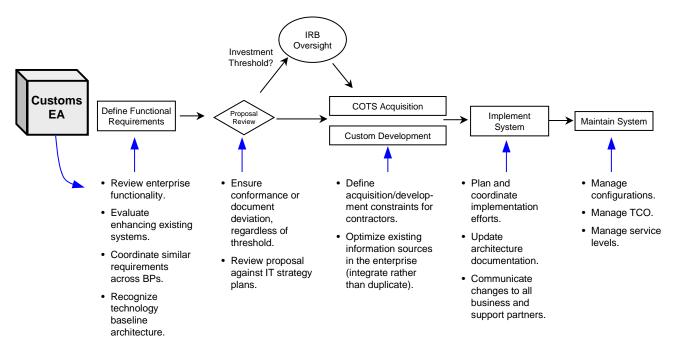


Figure 10: EA-Enabled Process

#### 1.4 Customs Architecture Principles

Customs architecture principles are the enduring, abstract or high-level rules and objectives that govern IT architectural decisions within Customs. They reflect compliance with both the Treasury and the CIO Federal architecture guidelines.

- 1. Information-processing activities shall comply with applicable laws, orders and regulations.
- 2. Business objectives must be well defined before initiating information technology solutions.
- 3. Total business value is the primary objective when making information technology decisions.
- 4. Enterprise architecture is an integral part of the Investment Management Process.
- 5. Architectural decisions shall maximize interoperability and reusability.
- 6. Customs enterprise architecture should take advantage of standardization based on common functions and customer requirements.
- 7. The divisions of the Customs Office of Information Technology should collaborate to provide the information, data and infrastructure required by the business units.

- 8. Business and information technology requirements should adopt commercial offthe-shelf technology rather than customized or in-house solutions.
- 9. Information and infrastructure are vital Customs assets that must be managed, controlled and secured.
- 10. Enterprise Architecture should be consistent with Customs guidance and strategic goals.

#### 1.5 ROLE OF CUSTOMS EA

The role of Customs EA is to enable the following:

- Faster response to changing business needs:
  - Architecture has readily available blueprints on current IT environment.
  - Senior decision-making can progress faster with lengthy fact-gathering minimized.
  - Integrated solutions are easier to visualize.
  - Blueprints readily highlight overlooked or missing information, which translates into Customs opportunities for IT solutions.
- Knowledge base:
  - Architecture framework provides Customs with a readily available pool of knowledgeable IT resources for quick and informed decision-making.
- Technical reference model with approved key technology standards:
  - Clear economies of scale across Customs.
  - Resource-sharing highlights common areas.
  - Market research of emerging technologies is shared enterprisewide.
  - Attention is often concentrated on "bleeding edge" technology; this has resulted in wasted time and effort.
  - The architecture focuses on proven market technologies.

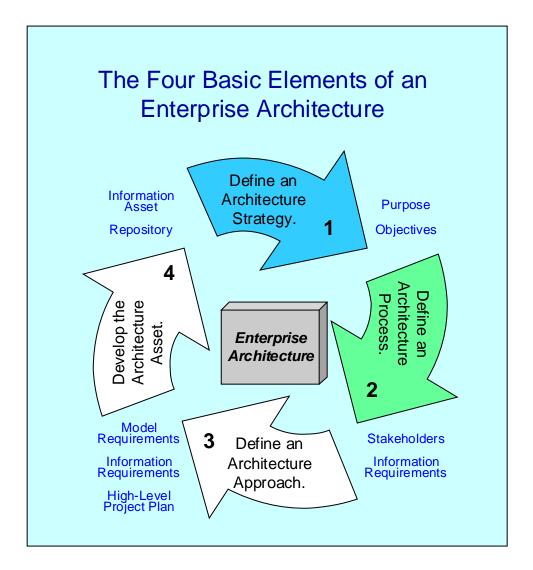
The role of Customs EA is to support the following:

- IT capital investment planning
  - Defines a target direction for future IT acquisitions—for both application systems and infrastructure.
  - Facilitates Customs capital investment decision-making.
- The architecture and the IMP now act as an integrated process
  - No funding or approval to proceed without architecture compliance.
  - A waiver/exception process will be administered by the TAG.
  - The governance mechanism incorporates roles from all levels of the Customs organization—domain owners, business information technology

representatives/business interface representatives (BITRs/BIRs), TAG, TRC, ITC and the IRB.

- The IRB is the ultimate approval body.
- The architecture processes, roles, methodologies and blueprints must facilitate decision-making
  - Provides a repository of information.
  - Enables the impact of changes to be assessed.
  - Helps in balancing long-term business goals with short-term IT development.

# 2 ARCHITECTURE PROCESS



# Key Issues

- How will we manage the architecture?
- Who and how will people use the architecture?
- What type and form of information must the architecture provide?

#### 2.1 OVERVIEW

This section presents the architecture-related processes that will be used to both provide checkpoints during the life cycle of an information technology (IT) project and manage the technical standards that comprise the target technical architecture. These processes are also identified with the roles and responsibilities of the organizational entities within Customs that will be managing, governing, facilitating and assisting in the performance of the architecture activities.

Currently, many of the activities revolving around architecture (i.e., product standards development, vendor management and technical specifications) are being performed within the Office of Information and Technology (OIT) on a one-off basis. The key objectives for the set of processes described in this section are to provide context, coordinate efforts, communicate the results/decisions and assign permanent roles inside the organization.

The benefits provided by instituting these processes include:

- Making sound technology investments that are in alignment with the business' needs
- Compliance with Treasury Information Systems Architecture framework (TISAF)
- Distributed decision-making and responsibility
- Reduction in duplication of efforts by multiple teams
- Reuse and repeatability of selection efforts across projects
- Gaining access into the application life cycle at the conceptual stage rather than at the deployment stage.

#### 2.2 CURRENT ASSESSMENT

The current assessment presents a snapshot of the accomplishments within the Enterprise Architecture (EA) effort at Customs relating the development and implementation of the architecture processes and roles.

- Many of the activities such as product evaluations, attending vendor conferences, researching technology trends, etc., are being performed within OIT on a one-off basis, responding individually to new requests from the users. The objectives for these processes are to better communicate and coordinate within OIT to ensure that we can leverage past efforts and easily inform all parties of the compliance requirements of the architecture.
- Customs has already established and implemented the key organizational governance components to approve, review and direct architecture standards technical architecture group (TAG), technology review committee (TRC), information technology committee (ITC), investment review board (IRB).
- The business information technology representatives (BITRs) are in place within each business operating unit and are already serving as checkpoints for business architectural alignment. The role of the BITR will be supplemented with the introduction of the business interface representatives (BIRs) within the software management division. The processes contained in this section provide an assessment mechanism to illustrate and provide traceability to this alignment.
- New processes and roles to manage and use the architecture have been developed and proposed in this document. The processes have been built with feeds into and out of existing processes—Investment Management Process (IMP), SDLC.

 The Enterprise Architecture Repository (EAR) has been developed and populated with the baseline and target information required to enable these processes. This information includes: business process profiles, application system profiles, infrastructure platform views and the technical reference model containing the standards profiles.

#### 2.3 PLANNING CONCEPTS

#### Alignment

- Alignment refers to the arrangement of things in relation to one another.
- The purpose of aligning an organization is to focus people, money, time and energy on some important (most likely, business/mission) issue.
- This arrangement can be illustrated with a subjective measurement of fit based on the perspective of the group scoring a consensus model. While this may produce misalignment with perspectives not considered by the group (i.e., strategic vs. operational), it does provide a mechanism to assess the impact of new changes on the previous decisions captured in the alignment model (i.e., changes in priorities).

#### Governance

- "Governance" refers to a set of roles or mechanisms established to determine if changes should proceed based on the existing policies, rules and standards of the current environment.
- This represents a set of political processes for making and enforcing IT-related business policies where they count—in the business.
- Typically, governance solely concentrated at the CIO is overwhelming and fails to help the IT organization understand how to change in response to a very-muchchanged business world of highly interdependent IT capabilities and business capabilities.
- A more effective approach distributes governance across a role-based organization model utilizing a network of an architecture office (i.e., TAG), local relationship managers (i.e., BITRs,BIRs), technology expertise (i.e., domain owner) and steering committees (i.e., TRC, ITC, IRB).

#### Roles

- A "role" is the part played by someone in a particular step in a process.
- The role can be triggered by many different events (i.e., usage, time, external event).
- The focus of a role-based organizational model is not to define the structure, but rather the services and processes it must provide. The hand-offs required by

each step in the process provide the key elements to understanding the nature and expectations of the roles.

### Responsibilities

- Responsibilities provide further insights into the expectations placed on a role without providing an explicit reference to a process.
- Examples of responsibilities include: listen, inform, communicate, provide guidance.

#### **Standards**

 Guidelines, technology reference model (TRM) structure (services, domains and sub-domains) and product selection strategies.

# 2.4 IMP GOVERNANCE ROLE-BASED MODEL

The recent refinements to the IMP ensure that all IT-related projects will be approved and managed based on Customs business requirements, and have accountable sponsorship. The IMP has already charted and implemented the key governance groups (TRC, ITC and IRB) that will manage and enforce these new policies. The role-based model figure illustrates from where each member of each group is assembled.

In order to effectively conduct the IMP, several touchpoints exist where the TAG must facilitate an assessment, recommendation and decision process to ensure compliance with the EA. These processes are identified to the as the architecture processes 1-4. The figure below shows the high-level IMP process at Customs.

**Customs High Level IMP** 

# Concept and Architecture Select Phase Business Strategy Planning Detailed Costs (Initial) Detailed CBA (Initial) (# > \$100K) Project Plan Conformance to Technical Architec Data Sensitivity Categorization User Requirements Acquisition Planning Project Project Project Definition\* **Control Phase** System Design\* Customs Programming Budget Process or Construction\*\* Acceptance\*\* Implementation Transition\*\* Evaluate Phase Operation Production\*\*

IMP Governance Group Members (see chart below)

• IRB: Investment Review Board 
• ITC: Information Technology Committee 
• TRC: Technology Review Committee 
• IMP Architecture Process Touchpoints

• Assess Business Alignment

2 Assess Solution Proposal

3 Assess Technical Compliance

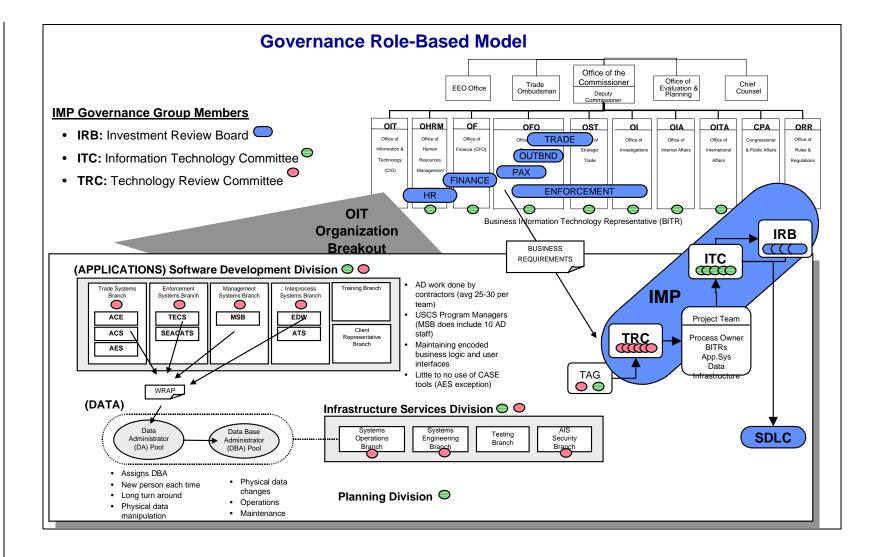
• Evaluate Architecture Compliance

Figure 11: Customs High-level IMP

Flow and Deliverables

The Governance Role-based model shown below illustrates the entities within Customs and the participation within the IMP.

Chapter 2, Architecture Process



# 2.5 TECHNOLOGY ARCHITECTURE MANAGEMENT ROLE-BASED ORGANIZATION MODEL

In addition to the set of IMP-related processes, Customs has developed a set of architecture processes, identified as 5-7, directed toward the management, assessment and governance of the technical architecture.

These processes utilize the TRC group as the primary decision-making body for the introduction of new or revised standards into Customs technical reference model (TRM). Domain owners and subject matter experts are assigned by the TRC members from their own management structures to provide evaluation skills and technical expertise relating to their areas of competency within the OIT organization model. Three distinct roles have been developed for members of the TAG staff to play in the conduct, management and administration of these architecture processes.

#### Roles

- Technology Review Committee (TRC)
- Technology Architecture Group—Architect (TAG-Architect)
- Technology Architecture Group—Administration (TAG-Admin)
- Technology Architecture Group—Audit (TAG-Audit)
- Domain Owners (DOs)
- Subject Matter Experts (SMEs).

#### **Architecture Processes**

- 5. Assess Waiver/Exception Request
- 6. Conduct Standards Review
- 7. Perform New Standards Development.

Chapter 2, Architecture Process

# **Technology Architecture Management Role-Based Organization Model**

#### Skills:

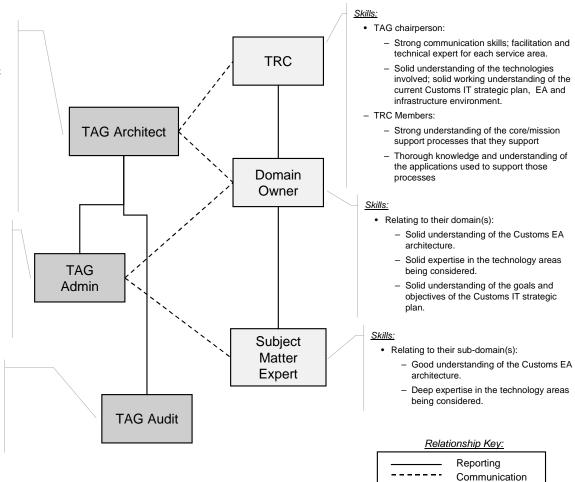
- Strong communication skills; facilitation and technical expert for each service area.
- Solid understanding of the technologies involved; solid working understanding of the current Customs IT strategic plan, EA and infrastructure environment.
- Solid analytical skills (ability to use tools to support analysis process).
- · Ability to prioritize and manage multiple projects.
- Strong understanding of the core business process areas; solid understanding of the Customs EA repository and its associated tools. strong architecture development and maintenance experience.

#### Skills:

- Expertise in the USCS architecture models, repository and tools.
- Working understanding of the technologies involved; solid working understanding of the current Customs IT strategic plan, EA and infrastructure environment.
- Strong communication skills; strong training materials development background.

#### Skills:

- Working understanding of the processes and technologies involved; solid working understanding of the current Customs IT strategic plan, EA and infrastructure environment.
- · Good communication skills



#### 2.6 ARCHITECTURE PROCESS OVERVIEW

The architecture-related processes both provide checkpoints during the life cycle of an IT project and manage the technical standards that comprise the target technical architecture. These processes are identified with the roles and responsibilities of the organizational entities within Customs that will be managing, governing, facilitating and assisting in the performance of the architecture activities.

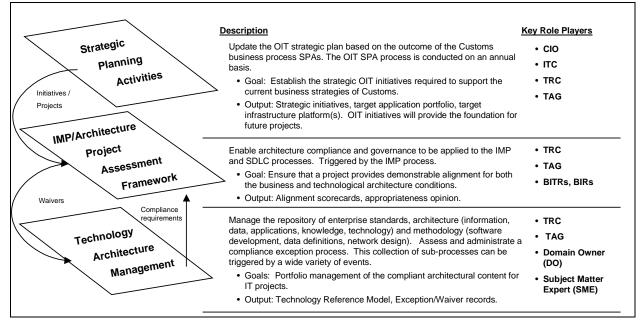


Figure 12: Architecture Process Framework

# **Strategic Planning Activities**

The figure below shows the high-level touch-points between the Customs strategic planning activities and the OIT strategic planning activities.

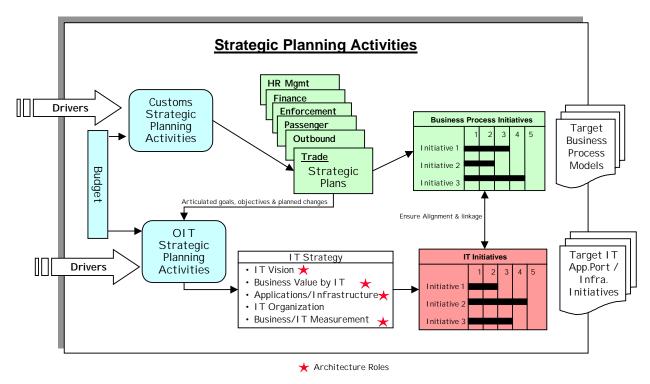


Figure 13: Strategic Planning Activities

# **IMP/ Architecture Project Assessment Framework**

This framework enables architecture compliance and governance to be applied to the IMP and SDLC processes.

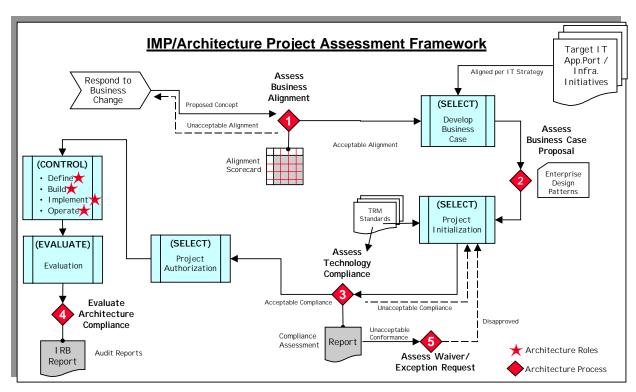
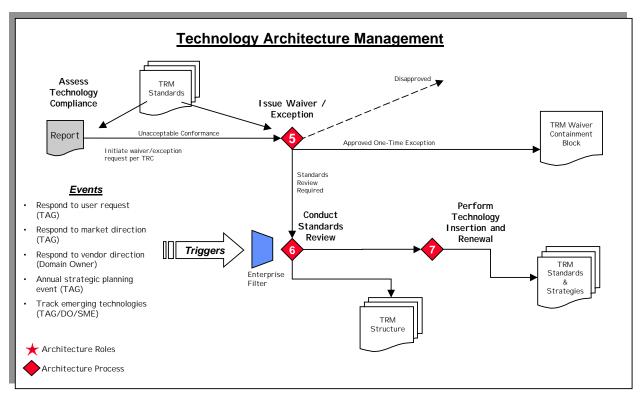


Figure 14: IMP/ Architecture Project Assessment Framework

### **Technology Architecture Management**

The processes in this layer are designed to manage the technical architecture compliance for IT projects proposed by the process areas.



**Figure 15: Technology Architecture Management** 

The following charts illustrate the seven key architecture processes within the IMP/Architecture Project Assessment Framework and the Technology Architecture Management activities. Key objectives for each process are described in this section to provide the context, coordinate efforts, communicate the results/decisions and assign permanent roles inside the organization.

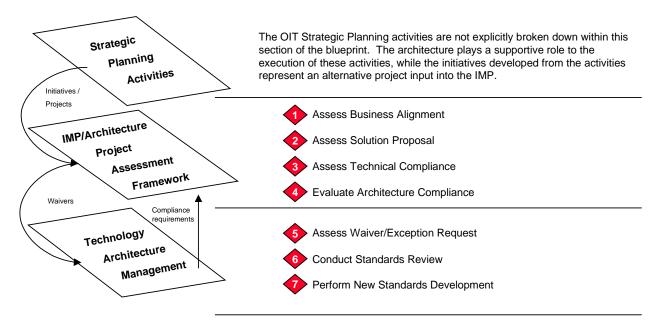


Figure 16: Mapping of Architecture Processes to the Framework

#### 2.7 Assess Business Alignment



# Description

Architecture process to determine if the project idea submitted by the process area is in alignment with strategic plans, goals and objectives.

- Goal: Establish alignment of business objectives to concept high-level requirements.
- Trigger: Changes in business process that require modifying existing applications or developing new applications.
- Output: Business alignment decision, business alignment matrix or scorecards.

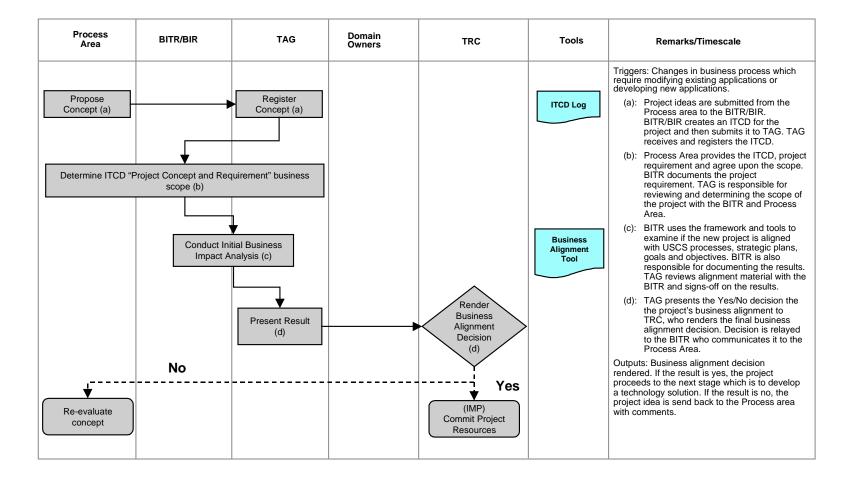
### Key Roles

- Process team:
  - Responsible for devising the project concept in response to a business change.
- BITR/BIR:
  - Develop the criteria for the business alignment scorecard and conduct the business impact analysis.
  - Develop ITCD project concept document in conjunction with the process area.
  - Establish metrics against which project ideas can be measured and be held accountable.
- TAG:
  - Facilitate and coordinate the business alignment activities.
  - Document the results and present to the TRC.
- TRC:
  - Render the business alignment decision.
  - Commit resources to the project if the alignment decision is "yes".

#### Tools

Business alignment scorecard.

Chapter 2, Architecture Process



#### **Business Alignment Tool**





"Alignment" refers to the arrangement of items in relation to one another. An alignment tool provides a method to illustrate this relative arrangement so that others can understand how a project's concept requirements are intended to support the goals/objectives of the organization.

- The alignment tool is intended to document the outcome of a group exercise conducted to derive how the project demonstrates or lacks alignment with the goals/objectives. The composition of this group will depend on the scope and scale of the concept proposal, but at a minimum should include the appropriate BITR(s)/BIR(s), representation from the process area(s) and representation from TAG. Assuming that the process area has already articulated its goals/objectives as part of the strategic planning activities, this exercise may require no more than a simple meeting to discuss how the concept relates to those goals/objectives.
- The alignment tool can be used to capture the relationships in the form of either a simple 2x2 matrix or a scorecard format including importance weighting and relation-fit scores (i.e., inhibitor vs. enabler).
  - The 2x2 matrix is used to indicate where a relationship exists (i.e., project requirement No.2 supports organizational objective No.1) by indicating an interaction point on the matrix. This approach does not capture an order of magnitude measurement of the fit on the relationship (i.e., minimally supports or strongly supports) or allow the user to associate greater importance to one goal/objective over another.
  - The score card extends the 2x2 matrix to include the use of a subjective alignment score to describe the interaction and relative weighting criteria to amplify the results based on the importance of either the goals/objectives and the requirements. This enables an aggregate score to be calculated so that it is easily determined if a sufficient level of alignment has been demonstrated to accept the concept.
- A caveat to alignment scoring is that it employs a subjective measurement biased by the perspective of the group deriving the consensus scores. Although this may produce "misalignment" with perspectives not considered by the group (i.e., strategic direction vs. operational concerns), it does enable a user to assess the impact of new changes (i.e., shifts in importance or changes in requirements) on the previous decisions captured in the alignment model.

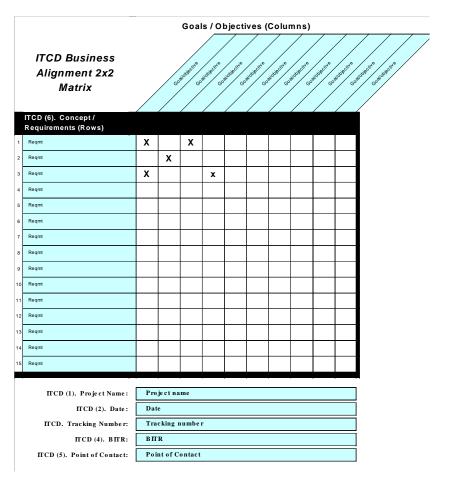


Figure 17: Business Alignment 2x2 Matrix

#### 2x2 Matrix Approach

The 2x2 matrix is used to indicate where a relationship exists (i.e., project requirement No.2 supports organizational objective No.1) by indicating a point of interaction on the matrix:

- The Goal/Objectives for the process area should already have been articulated during the strategic planning activities. These may include both near-term and long-term horizons.
- The Concept/Requirements should describe what the proposal will deliver. These
  requirements should be oriented to present a high-level view of the concept—
  limited to no more than 15.
- This approach does not capture a measurement of fit on the relationship (i.e., minimally supports or strongly supports) or allow the user to associate greater importance to one goal/objective over another.
- The user must visually interpret if sufficient alignment has been demonstrated during the exercise.

 This approach does not enable the impacts of later changes (i.e., re-prioritizing objectives) to be easily used to re-evaluate decisions.

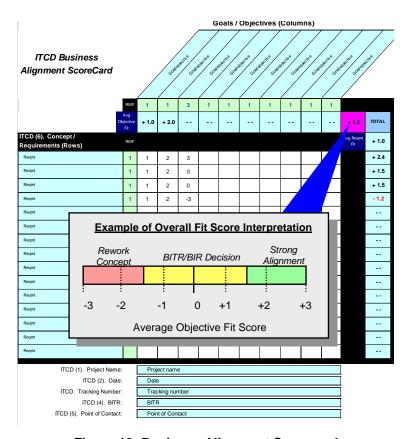


Figure 18: Business Alignment Scorecard

# Scorecard Approach

The scorecard extends the 2x2 matrix to include the use of a subjective alignment score to describe the interaction and relative weighting criteria to amplify the results based on the importance of either the goals/objectives and the requirements:

- During the exercise, a subjective score is determined for each relationship to indicate if the requirement acts as an inhibitor (-) or enabler (+) to the objective.
- A relative weighting factor can also be applied to either dimension based on varying levels of importance. This factor is used to calculate the average score.
- The calculated average score provides a summary score for the concept matrix.
   This can be used to easily determine if a strong enough level of alignment has been demonstrated to accept the concept or if the concept needs to be reworked or dropped.

 The advantage of this approach is that impact analysis can be performed at a later time by changing the weights or scores to determine if the project needs to be re-evaluated based on a change in the new average score.

# 2

#### 2.8 Assess Business Case Proposal

### Description

Examine the proposed solution, at a high level, to determine the level of impact being introduced into the Customs technology environment. This activity requires the architect to take an active role in the business case/solution development step in the IMP to ensure that reasonable levels of risks, time, costs and implications to OIT have been addressed in assessing scores for the IMP business case criteria. The architect should interpret the requirements and solution proposals to determine if duplication exists in the current application portfolio or opportunities exist to extend a current system(s) to meet these new needs rather than buying or building a new system:

- Goal: Ensure that the solution provides demonstrable applicability for both the business and technological architecture conditions.
- Trigger: IMP process and solutions proposed.
- Output: Appropriateness opinion.

# Key Roles

- TAG:
  - Conduct a high-level assessment to interpret the solution being proposed by the process area.
  - Develop best practices on technology and architecture issues.
  - Provide guidance to the process area/project teams on technical architecturerelated issues and emerging trends in the industry.

#### Tools

- Industry trends and research on guidelines, principles and product standards.
- Enterprise design patterns best practices (see Architect's Toolkit).

#### 2.9 Assess Technical Compliance



# Description

Determine if the technology architecture of the solution proposed is in compliance with enterprise standards, architecture (information, data, applications, knowledge, technology) and methodology (software development, data definitions, network design) as defined by the TRM.

- Goal: Management of the compliant technology architectural content for IT projects.
- Trigger: Technology architecture solution developed in the SDLC process.
- Output: Technology alignment scorecards, TRM, Exception/Waiver requests.

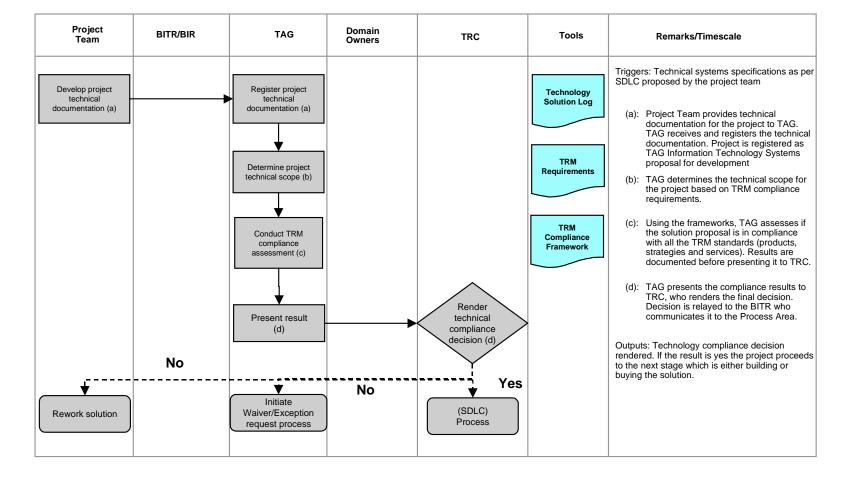
# Key Roles

- Project Team:
  - Develop technical documentation for the project.
- TAG:
  - Determine project scope and assess if the technology architecture being proposed is in compliance with the TRM standards.
  - Document outcome of the technical compliance process and present it to TRC for a final decision.
- TRC:
  - Render technical compliance decision.

#### Tools

TRM compliance requirements.

Chapter 2, Architecture Process





#### **TRM Compliance Framework**

The purpose of the framework is to determine the appropriate contents of the TRM compliance framework applicable to the project based on the architect's interpretation of the project's technical scope. This scope is determined from a review of the SDLC technical documentation and the Technology Reference Model requirements.

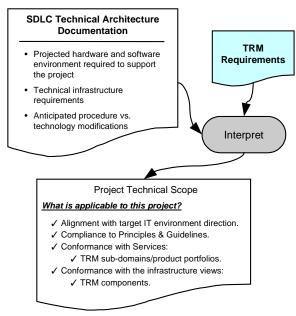


Figure 19: TRM Compliance Framework

The Technical Reference Model (TRM) is a generally accepted representation of the generic components of an information system. It allows designers, developers, and users to agree on definitions, have a common understanding of the services to be provided, and identify and resolve issues affecting interoperability, portability, and scalability.

- The objective of a TRM is to provide a standardized component structure or model that can be used to guide the design, development and selection of both customized and COTS information systems that meet the specific business needs of Customs.
- The TRM also enables planners to define the information required to support the both the IMP project assessment and technology architecture management activities. This includes the principles and guidelines, technology service areas, applicable standards, selection criteria and target technical product/services portfolios.





The dimensions of the technical compliance issue do not as easily adapt to a scorecardenabled assessment approach as does the business alignment issue.

Assessing technical compliance requires the architect to interpret how well the business, IT and user requirements are met by the technology designs (i.e., application topologies, data architectures, movement vs. access strategies, system parameters—reliability, maintainability, mobility, security) and if the technology selections have conformed to the TRM standards.

#### Project Technical Scope

#### What is applicable to this project?

- ✓ Alignment with target IT environment direction.
- ✓ Compliance to Principles & Guidelines.
- ✓ Conformance with Services:
  - ✓ TRM sub-domains/product portfolios.
- ✓ Conformance with the infrastructure views:
  - ✓ TRM components.

Compliance Dimension	Input Sources	Key Attributes	<u>Outcomes</u>
Business and Technical architecture assessment	Stakeholders requirements (i.e., users, process & OIT), SDLC BSD and TD plans	User types, delivery architecture, deployment model, expected service levels—performance models, rollout strategy	Architect's review comments
Technical architecture conformity to TRM	SDLC TD plans, project technical scope assessment, TRM standards	Services, products, infrastructure models, migration/deployment schedules	Document conformity against TRM requirements (repository check-off report)

#### 2.10 EVALUATE ARCHITECTURE COMPLIANCE



#### Description

Determine if the documentation, functional analysis, general design, detailed design are in compliance with the architecture components approved through the "Assess Technology Compliance" process.

- Goal: Audit the system design and analysis documentation to ensure architecture compliance
- Trigger: Evaluate stage within the SDLC process
- Output: IRB Report

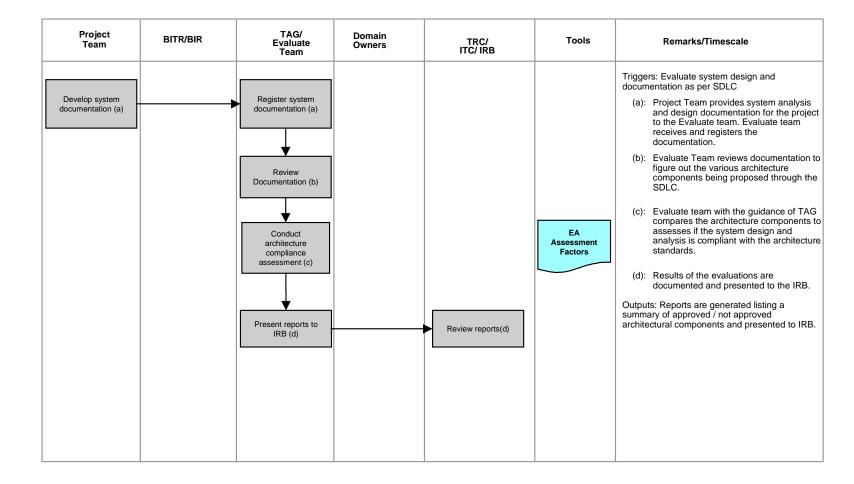
#### Key Roles

- Project Team:
  - Develop system documentation for the project
- TAG/Evaluate Team:
  - Assess if all the components, documentation, design being proposed is in compliance with the architecture standards
  - Document outcome of the architecture compliance process and present it to IRB
- TRC/ ITC/ IRB:
  - Review reports

#### Tools

Enterprise Architecture Assessment Factors

Chapter 2, Architecture Process







#### **EA Assessment Factors**

Purpose: Provide the enterprise architecture compliance factors against which all IMP/SDLC delivered projects must comply. The TAG-Evaluate team will perform the compliance assessment as part of the SDLC Evaluate process. The factors are arranged into seven categories (Business, Information, Data, Application, Infrastructure, Security, and Standards).

Business	<ul> <li>Data entities are clearly defined and maintained in a data model. Data elements are contained in a data dictionary and include element name, attributes, and relationships with other data entities</li> </ul>
	<ul> <li>Data is accessible to those who need to use it</li> </ul>
	<ul> <li>Data Integrity refers to the assurance that the data is valid and accurate</li> </ul>
	Replication, Duplication, and Redundancy
Information	<ul> <li>The application provides level of information that top management needs through tools like rolled-up detail data, summary reports, or decision support systems</li> </ul>
	<ul> <li>Information is presented through an intuitive interface which users of all levels find acceptable</li> </ul>
	<ul> <li>Business Information available through this application is reliable and timely</li> </ul>
	<ul> <li>The application uses and populates information shared by/with other applications</li> </ul>
Data	<ul> <li>Data entities are clearly defined and maintained in a data model. Data elements are contained in a data dictionary and include element name, attributes, and relationships with other data entities</li> </ul>
	<ul> <li>Data is accessible to those who need to use it</li> </ul>
	<ul> <li>Data Integrity refers to the assurance that the data is valid and accurate</li> </ul>
	Replication, Duplication, and Redundancy
Application	<ul> <li>The development methodology for this application uses industry-accepted standards and best practices</li> </ul>
	<ul> <li>The applications will be maintained efficiently and</li> </ul>

	economically. It can be scaled to various sizes and adapted or ported to support future applications
	<ul> <li>Interoperability among applications involves the deployment of the applications as well as the modular components used in development</li> </ul>
	<ul> <li>Sequencing of applications based on priorities based and factors that reflect the business needs of the entire organization, the least cost build concept, data sharing, and business priorities</li> </ul>
Infrastructure	Service delivery
	<ul> <li>Interoperability at the technical infrastructure level describes a model on which anything may be connected to anything else</li> </ul>
	Network connectivity
	<ul> <li>Technical Maturity describes the subjective maturity of the technology in relation to the marketplace</li> </ul>
Security	<ul> <li>Protection of business information through policies and guidelines ensures the free flow of information within the enterprise without risk</li> </ul>
	<ul> <li>Security encompasses the data, applications, and technology used in this application</li> </ul>
Standards	This application represents mutual agreement on many standard definitions of business functions, and data and information needs
	This application will be built using standards-based application tools and technology infrastructure

#### 2.11 Assess Waiver/Exception Request



#### Description

Examine standards affected, implications for other systems, cost implications, risks involved with the introduction of the IT project:

- Goal: Establish the implications and ramifications of the IT project and issue an exception only if there are good business reasons.
- Trigger: Lack of technology alignment of the IT project.
- Output: One-time exception, initiate standards review process.

#### Key Roles

- TAG:
  - Initiate the waiver/exception request process.
  - Log the exception requests for future reference.
  - Determine the impact of introducing a non-standard technology on existing applications, infrastructure, and resources (financial and human).
  - Document results and present it to TRC for a final decision.
- TRC:
  - Render waiver/exception decision, yes or no.

#### Tools

Waiver Key Criteria

Chapter 2, Architecture Process





# **Waiver Key Criteria**

Purpose: Define criteria against which the waiver/exception needs to be evaluated. TAG will use one or more of the criteria depending on the size of the project:

- Standards affected
- Description (scope, reasons)
- Dependencies (implications for other systems, implied further investments)
- Risk analysis (new unproven technologies, missing know-how, questions about compatibility)
- Milestones
- Benefits (business benefits, complying with regulations)
- Total costs (investment costs: HW, SW, licenses, external consulting, internal labor cost; operation costs: time frame—generally five years, exceptions possible)
- Cost/benefit analysis
- Management summary.

## 2.12 CONDUCTS STANDARDS REVIEW



## Description

Evaluate existing standards to determine if any modifications are necessary to accommodate repetitive exceptions or external technology trends:

- Goal: Keep the TRM structure current to reflect external technology trends and repeated waiver requests.
- Trigger: Waiver/Exception process, external technology market trends.
- Output: Modify TRM structures, trigger new standards development process.

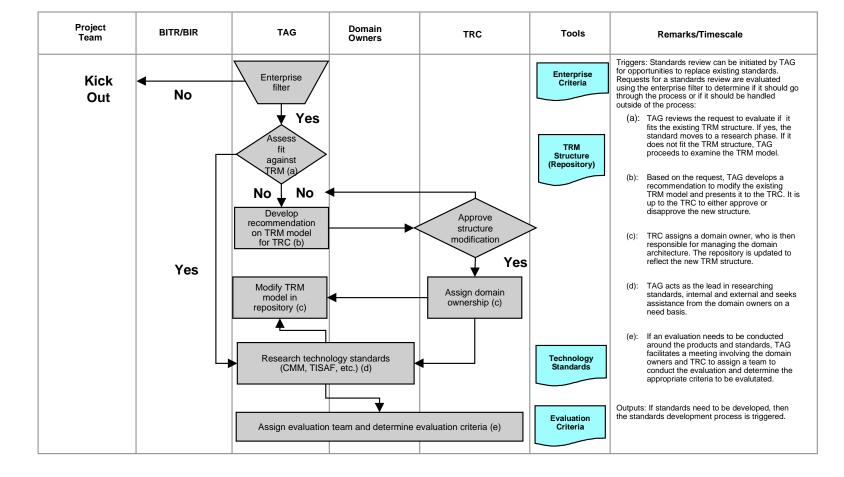
## Key Roles

- TAG:
  - Define and develop the enterprise filter.
  - Assess request to examine if it fits within the current TRM structure.
  - Develop recommendation on TRM model if request does not fit existing structure.
  - Act as the lead in researching standards, internal and external.
- TRC:
  - Render decision on proposed TRM structure.
  - Assign ownership for the domain within the TRM structure.
  - Assign an evaluation team to perform the standards development process.
- Domain Owners:
  - Research technology standards in conjunction with TAG.
  - Assign resources to the evaluation team.

## Tools

- Enterprise Filter
- Evaluation Criteria

Chapter 2, Architecture Process







# **Enterprise Filter**

Purpose: Used as a tool to filter-out any non-enterprise requests from proceeding through the standards review and standards development processes.

Criteria: Factors against which requests (products/standards) should be evaluated to determine if it should be handled through the architecture processes:

- Will be managed and supported by OIT (beyond the desktop icon).
- If a failure occurs, it will become a responsibility of OIT (software crash, loss of data, security issue).
- Anticipated to support application development or deployment.
- Part of a procurement strategy.
- Covered by an existing standard.

If the request is "yes" to any of the criteria, it proceeds through the standards review process.

If the request is "no" to all the criteria, then it is handled outside of the architecture processes.





## **Evaluation Criteria**

Purpose: Used to direct a facilitated product or standard evaluation/selection activity. A scoping exercise is conducted by TAG and the appropriate Domain Owners to determine the set of criteria under which the product(s) or standard(s) will be evaluated in the .

Examples of criteria that constitute the evaluation framework:

- Vendor viability and ability to execute
- Functionality
- Cost
- Industry standards
- Scalability
- Required skills
- Coexistence with existing systems (integration)
- Support and services
- 3rd-party alliances or independent service vendor (ISV) support
- Security
- Installed base
- Other.

Within the evaluation framework weights will be developed with for each of the criteria to assign degrees of importance to the criteria based on the conditions surrounding the evaluation. For example, scalability may be considered a low priority for a standalone desktop modeling tool to be concentrated in the DBA group but it be a very high priority for an enterprise document management system to be deployed across multiple work locations and user groups. Judgment may still be required to develop more granular or detailed levels for each of the critical criteria, based on the request.

## 2.13 Perform Technology Insertion and Renewal



## Description

Develop new standards, strategies and methodologies for architecture (information, data, applications, knowledge, technology) and methodology (software development, data definitions, network design).

- Goal: Creating or modifying technology standards within the TRM structure.
- Trigger: Outcome of standards review process or planned standards development process.
- Output: Updated Technology Reference Model.

# Key Roles

- TAG, Domain Owners, Subject Matter Experts:
  - Conduct market research, attend vendor demos and perform product evaluations.
  - Create a draft for discussion purposes. The draft is a white paper that details the steps performed during the evaluation and the outcomes.
  - Facilitate or conduct the detailed in-house evaluation to select products or standards.
  - Generate the final recommendation and present it to TRC for a final decision.
  - Update repository to reflect the new standards.

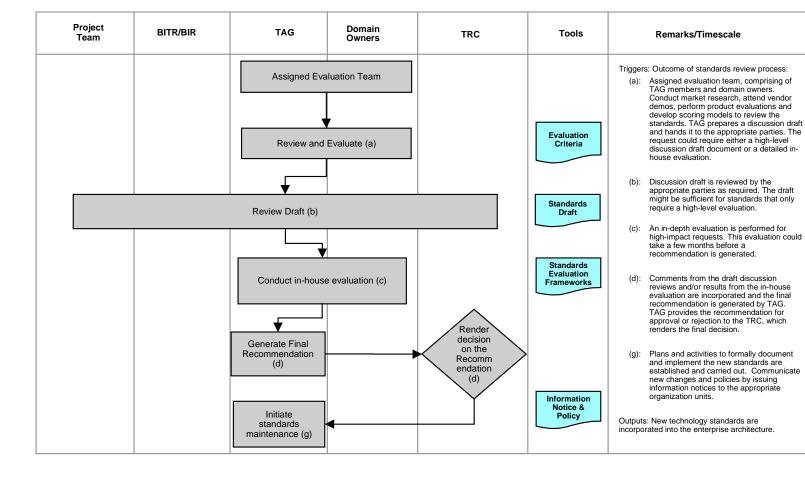
## TRC:

Render decision on the recommended standard.

#### Tools

- Evaluation Criteria—Drawn from the previous process.
- Standards Evaluation Framework—Generated specifically based on the request. Developed internally within Customs.

Chapter 2, Architecture Process







## Standards Evaluation Framework

Purpose: The standards development framework illustrates the array components that comprise the evaluation process within Customs. The components can be grouped into those that support the pre-evaluation, the conduct-evaluation and the post-evaluation phases of the effort.

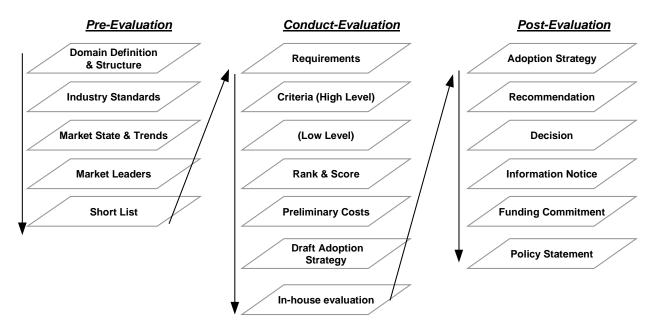


Figure 20: Standards Evaluation Framework

# 2.14 ROLES AND RESPONSIBILITIES

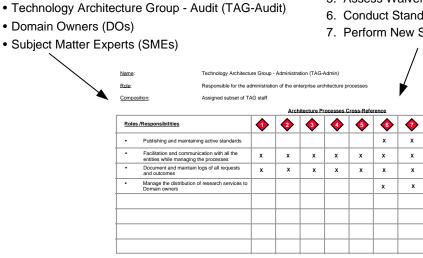
The following charts illustrate the key roles and responsibilities for each of the new roles in the Technology Architecture Management role-based organization model with crossreferences to the processes for which they are participants.

#### Roles

- Technology Review Committee (TRC)
- Technology Architecture Group Architect (TAG-Architect)
- Technology Architecture Group Administration (TAG-Admin)

#### **Processes**

- 1. Assess Business Alignment
- 2. Assess Business Case Proposal
- 3. Assess Technical Compliance
- 4. Evaluate Architecture Compliance
- 5. Assess Waiver/Exception Request
- 6. Conduct Standards Review
- 7. Perform New Standards Development



# **Technology Review Committee**

Name: Technology Review Committee (TRC)

Role: Decision making body with regard to enterprise architecture standards

Composition: OIT representatives from the Applications, (Data) and Infrastructure

organizations, chaired by the TAG-Architect

Roles /Responsibilities	•	2	3	4	5	6	<b>◆</b>
Sets corporate IS policies, procedures and standards based on proposals made by the TAG					X	х	Х
Responsible for rendering final decision on alignment and technology standards issues	х		X		x	X	X
Acts as an information-sharing and coordination forum with regular meetings							X

Figure 21: Roles and Responsibilities—TRC

# **Technology Architecture Group - Architect (TAG-Architect)**

Name: Technology Architecture Group - Architect (TAG-Architect)

Role: Develops formal standards requirements and submits to TRC,

responsible for the management of the architecture processes

**Composition**: Architectural process manager

Roles /Responsibilities	<b>1</b>	2	3	4	5	6	<b>◆</b>
Conducts the standards review process and directs the new standards development process						Х	Х
Works out recommendations and proposals for the TRC as basis for decision making	X		X		X	X	X
Highlights areas of potential improvement						X	
Responsible for portfolio management of TRM					Х	X	Х
Develop, maintain and refine principles, guidelines, product standards		Х				Х	Х
Research and develop platform profiles on an on-going basis		Х					Х
Develop and maintain frameworks, models to perform the processes	Х		Х			Х	Х
Responsible for retiring outdated standards							Х

Figure 22: Roles and Responsibilities—TAG-Architect

# **Technology Architecture Group - Administration (TAG-Admin)**

Name: Technology Architecture Group - Administration (TAG-Admin)

Responsible for the administration of the enterprise architecture

processes

Composition: Assigned subset of TAG staff

Roles /Responsibilities	1	2	3	4	5	6	<b>♦</b>
Facilitation and communication with all the entities while managing the processes	х	Х	Х		х	х	Х
Document and maintain logs of all requests and outcomes	х	Х	х		х	х	х
Coordinate the distribution of research services to appropriate domain owners and SMEs						х	Х
Publishing and maintaining active standards						х	Х
Issue information notices							Х
Develop and document policies							Х

Figure 23: Roles and Responsibilities—TAG-Admin

# **Technology Architecture Group - Audit (TAG-Audit)**

Name: Technology Architecture Group - Audit (TAG-Audit)

Responsible for conducting architecture compliance audits (Evaluations)

Composition: Assigned subset of TAG staff

Roles /Responsibilities	1	2	3	4	5	6	<b>♦</b>
Conduct architecture compliance evaluation				X			
Report findings to the IRB				X			

Figure 24: Roles and Responsibilities—TAG-Audit

# **Domain Owner (DOs)**

Name: Domain Owner (DOs)

Role: Management of sub-domain portfolio, working with TAG on standards

insertions and renewals, assign resources (SMEs) and oversee the

evaluation efforts

Composition: OIT Managers

Roles /Responsibilities	1	2	3	4	5	6	<b>♦</b>
Review, validate, assess impact with TAG of proposals in the review process					х	Х	X
Coordinate activities with other domain owners, as appropriate						Х	X
Assign evaluation team resources						Х	
Oversee product evaluations, review recommendations prior to TRC submittal							Х

Figure 25: Roles and Responsibilities—Domain Owners

# **Subject Matter Expert (SMEs)**

Name: Subject Matter Expert (SMEs)

Role: Evaluation of specific areas for recommendation of standards

actions

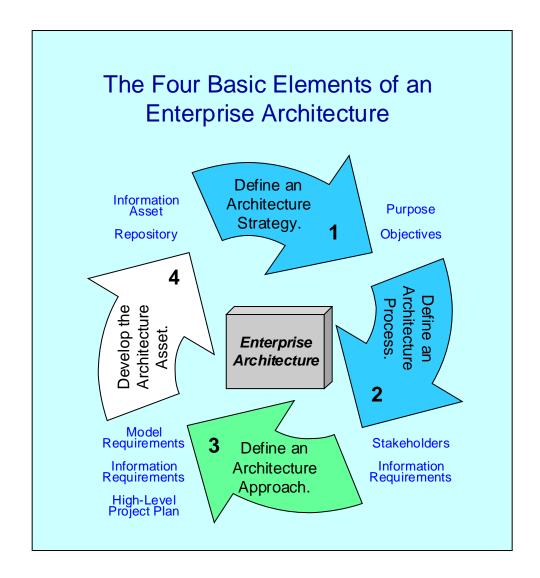
Composition: Sub-domain experts from OIT or outside consultants

Roles /Responsibilities	1	2	3	4	5	6	<b>♦</b>
Assess the current environment in specific technical areas							Х
Examine specific technology areas to determine appropriate standards with the domain owners							X
Evaluate alternatives and recommend technology standards or changes for review							X
Perform product evaluations and generate recommendations for submission to the TRC							X

Figure 26: Roles and Responsibilities—Subject Matter Experts

Chapter 2, Architecture Process	Department of The Treasury—United States Customs Service

# 3 ARCHITECTURE APPROACH



# Key Issues:

- Where can we collect that information? What will it take?
- How can we represent that information (methodologies/models)?
- How do we organize the models and information into a framework?
- To what level of depth do we need to model?

## 3.1 OVERVIEW

This section presents the architecture approach that has been employed to form the core information and relationships that define the architecture as an information asset. The approach is founded in both the Treasury Information Systems Architecture Framework (TISAF) and the CIO Federal Framework. Together these frameworks describe both the business and technical modeling elements that are used to develop baseline and target architecture perspectives.

- The business elements describe the business needs of the organization in terms of work models, functions and key information, and demonstrate how U.S. Customs information systems support the needs of the business community. This is accomplished through the use of high-level descriptions of the:
  - Organization's mission and target concept of operation
  - Business functions being performed and relationships among functions
  - Key information needed to perform the functions
  - User groups and locations of the functions and information
  - Information systems needed to support the agency's business needs
  - Component interdependencies (i.e., business units: processes: applications).
- The technical elements are used to ensure that new systems in the target environment are interpretable, function together efficiently and are cost-effective over their life cycles. These elements describe:
  - Specific information technology (IT) and standards
  - Systems development approaches and methodologies
  - Hardware/software platforms
  - Security, data management.

These elements are combined with both the architecture strategy, processes and roles and external influences (i.e., Federal guidelines, industry best practices, market research, development or selection strategies) to describe the context or meaning of the models that are contained in the Enterprise Architecture (EA). The distinctions in the context define the various dimensions of the architecture models. Each dimension carries an implicit modeling strategy—providing direction and scope to the development and use of the models—to ensure that the architecture information asset will deliver sufficient content and perspectives to support the architecture strategy.

These dimensions include:

 Modeling to Understand: Providing the core business, applications, information and infrastructure perspectives that illustrate the planned change initiatives for the agency and support impact analysis capabilities.

- Modeling to Validate: Providing logical application and data architecture enterprise design patterns to the architects to ensure that proposed solutions are applicable and reasonable to meeting the needs of the stakeholders.
- Model to Communicate: Communicating the technical compliance requirements
  of the technical reference model relating to strategic technical decisions,
  services, standards, core competencies and evaluation guidelines.
- Model to Select: Providing evaluation, integration and implementation frameworks to support the "BUY" strategy for commercial off-the-shelf (COTS) solutions.
- Model to Design: Providing the system analysis and system design architecture components necessary to "BUILD" high quality custom developed solutions.

# 3.2 CURRENT ASSESSMENT

The current assessment presents a snapshot of the accomplishments within the EA effort at Customs relating the definition of the architecture approach, frameworks, models and methodologies.

- The models currently contained in the repository satisfy the modeling to understand and communicate dimensions.
  - The repository utilizes three core profiles—business processes, application portfolio, Infrastructure platforms—to capture the context and content related to the change initiatives that transition the baseline environment to the target environment. Each profile is composed of a set of the framework elements that combine to describe relationships (i.e., applications to business processes, organizations to business processes, work locations to business processes, etc.) that allow the planner to interpret the level of change (i.e., localized, widespread) and assess the expected impacts due to the proposed changes in the business and technical environments.
  - The technical reference model (TRM) provides the primary communication medium to organize the services, technical standards, technical strategies and direction, product standards and implications relating to technical compliance with the architecture. The structure of the TRM has been rationalized and ownership has been assigned to each domain area as part of the technical architecture renewal workshop conducted on June 2-3, 1999.
- An initial collection of best practices relating to application and data architecture enterprise designs has been developed and is contained in the architect's toolkit. This material is intended to be used to support the architect in the "assess solution proposal" architecture process (No. 2).
- The dimensions covering the buy or build processes have not yet been formally covered by the architecture in terms of modeling. The architecture areas relating to these processes are currently covered by the principles and guidelines and the systems development life cycle (SDLC) guidance. Modeling activities are being extensively conducted in these areas by individual project teams but are not

currently coordinated under an enterprise modeling strategy. The level of detail associated with these models (design and selection) supports the builder's or sub-contractor's views and is therefore below the scope of the immediate strategy for the architecture asset.

## 3.3 ENTERPRISE ARCHITECTURE FRAMEWORK

An architecture framework consists of two levels of information

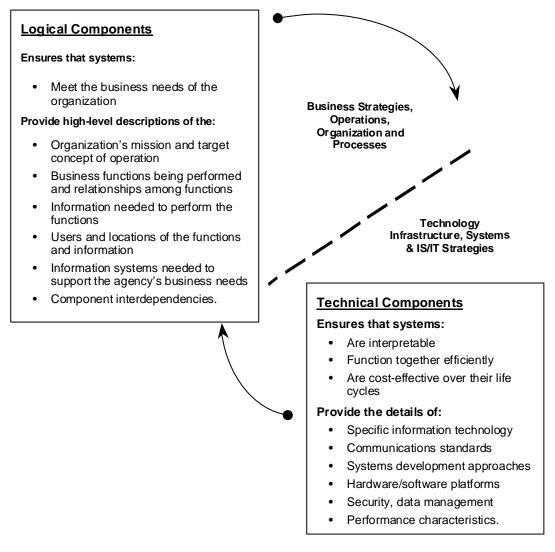


Figure 27: Architecture Framework

Logical components: Ensure that the information systems meet the business needs of the organization.

- The logical components include information pertaining to the business strategies, operations, organization and processes.
- Technical components: Ensure that the systems are interpretable, interoperable and cost-effective.
  - The technical components include information pertaining to the technology infrastructure, systems and the IT strategies.
- The relationships and linkages between the two components help understand the level of alignment between the business objectives and the IT services being provided.

# Federal Enterprise Architecture Framework—Level II

 The Federal Enterprise Architecture conceptual model is an organizing mechanism for managing the development, maintenance, and facilitated decision-making of a Federal Enterprise Architecture.

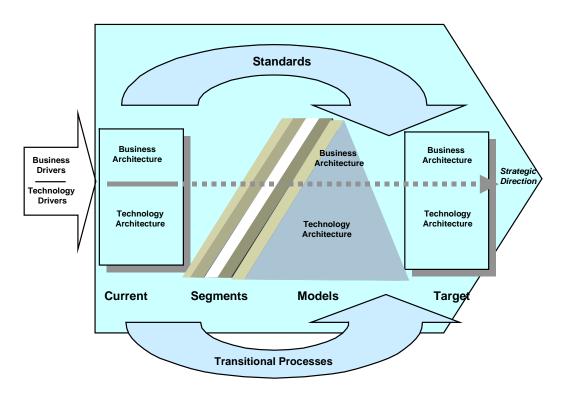
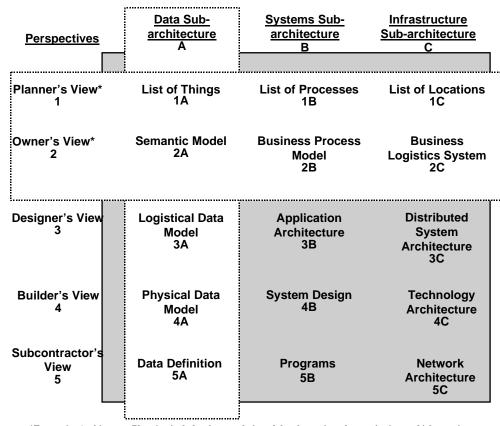


Figure 28: Federal Enterprise Architecture Conceptual Model

- The Federal Enterprise Architecture conceptual framework provides a structure for organizing Federal resources, and for defining and managing Federal Enterprise Architecture activities.
- Level II shows the business and technology pieces of the Enterprise Architecture, and how they are related. Viewed horizontally, the top half of the framework deals with the business of the enterprise, while the bottom half deals with the technologies used to support the business.
- The relationship of business and technology is a push/pull relationship where the business pushes technology and technology pulls the business to new levels of service delivery in support of business operations.

## **Federal Architecture Framework Models**



<sup>\*</sup>Enterprise Architecture Planning includes the completion of the planner's and owner's views, which constitutes the business architecture.

Figure 29: Federal Architecture Framework

 The models are contained in the intersections (cell, e.g., 1A) of rows (perspectives, e.g., row 1) and columns (architecture layers, e.g., A).

- The figure shows Column A, the Data Layer, has been highlighted, and the first two rows have been highlighted. Column A is one of the layers of the architecture. The first two rows are the business layers of the architecture.
- The focus for the current stage of the Customs Enterprise Architecture effort has concentrated on completely building out the planner's and owner's views perspectives.

## **USCS Views/Levels TISAF-Compliant Framework**

The Treasury Information System Architecture Framework (TISAF) describes an enterprise information system architecture in terms of four architectural views:

- A work architecture that specifies the decentralization of the business, the
  distribution of the work organizations to business locations, and the
  communication and coordination between these locations. It also describes the
  major operations performed by work organizations in support of functions and the
  types of work in terms of the type of workers and types of work location.
- An information architecture that identifies, defines, and organizes all of the information needed to perform the enterprise business operations and the relationships among that information. All data needed to support business functions should be captured in the information architecture.
- A functional architecture that identifies, defines, and organizes the business functions, processes, or activities that capture, manipulate, and manage the business information to support business operations. It also describes the logical dependencies and relationships among business functions.
- An infrastructure that specifies the hardware, software, and telecommunications components, management tools, security services, and distributed computing services to support the functional and information architectures.

Each view represents one horizontal dimension of the EA, with the enterprise level, business operation level, functional area level, function level representing the vertical dimensions. The mapping of the levels against the architectural views is presented in the following table. This table outlines the representations that occur in each architectural view, at different levels of the EA.

Views/ Architectures Levels	Work View	Functional View	Information View	Infrastructure View
Enterprise level	✓ Enterprise organization structure ✓ Customers	Business scenarios  Under the state of the s	✓ Common Key Information	✓ Technical reference model ✓ Corporate standards ✓ Corporate platforms
Business Operation level	Business Operating Units (BOU) BOU organizational structure Work locations Workflow models	✓ Business processes	✓ Key Information	Business operation- specific platforms and relationships
Functional Area level	✓ User Groups ✓ Key personnel	✓ Information systems	☐ Logical data models	Information systems- specific platforms
Function level	☐ Users ☐ User locations	✓ Information system functions	Physical data models Data bases	

## Customs EA must communicate:

- How people, places, offices and relationships make up Customs?
- Where the WORK of Customs is done and by whom?
- What *INFORMATION* they need to accomplish that *WORK* or to maintain those relationships?
- How the FUNCTIONAL processes provide the INFORMATION and link the WORK areas across Customs?
- The technical INFRASTRUCTURE required to support the Customs business environment: WORK + INFORMATION + FUNCTIONAL.

## Customs EA must be:

- Understandable
- Complete and consistent
- Traceable
- Scalable and adaptable
- Integrated.

# **Customs Views/Levels TISAF-Compliant Framework Modeling Regions**

The figure shows the various modeling regions within the TISAF framework that have been captured within the architecture.

## The models include the:

- Work Models
- Functional Business Models
- Functional Application Models
- Information Conceptual Models
- Technical Reference Model
- Infrastructure Models.

The cells not marked as models are more focused toward implementation efforts and are currently being reviewed.

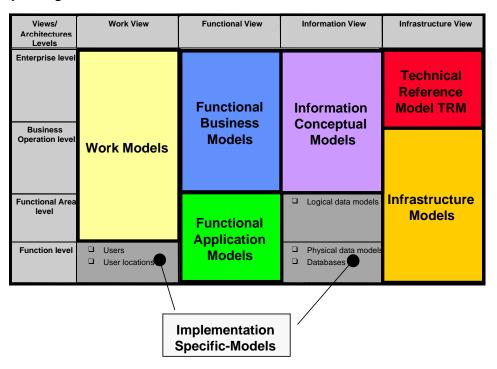


Figure 30: Modeling Regions

# Overlay: TISAF to the Federal Enterprise Architecture Framework Level II

In order to relate the two framework models, the figure below illustrates an overlay of the TISAF framework components that correspond to the backdrop of the Federal Framework components.

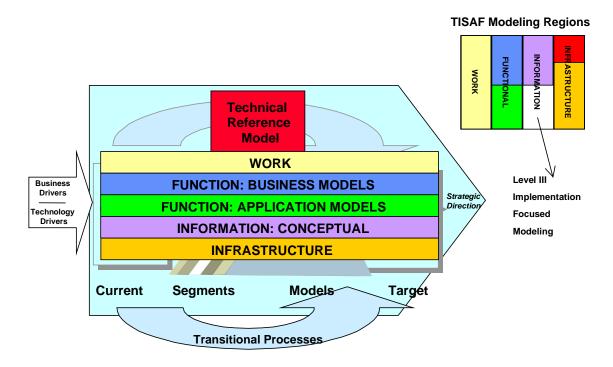


Figure 31: Framework Overlay

## 3.4 Architecture Modeling Strategy

## **Enterprise Architecture Dimensions**

The EA elements, when combined with both the architecture strategy, processes and roles and external influences (i.e., Federal guidelines, industry best practices, market research, development or selection strategies), provide the context to understand the objectives for each of the models that is contained in the EA. The modeling objectives address the question of **why** we should model the **who, what, where, when and how** of the business processes, information systems or infrastructures of the enterprise environment.

The distinctions that exist in the modeling objectives provide definition to the various dimensions of the architecture models. Each dimension carries an implicit modeling objective—providing direction and scope to the development and use of the models—to ensure that the architecture information asset will deliver sufficient content and perspectives to support the architecture strategy. In this section to the EAB, Customs introduces a five-dimensional framework to differentiate modeling objectives and align them to the architecture strategy, processes and roles and external influences.

These dimensions are defined as follows:

**Table 1: Enterprise Architecture Dimensions** 

Modeling Dimension	Included in Current EA Scope
<u>Modeling to Understand:</u> Providing the core business, applications, information and infrastructure perspectives that illustrate the planned change initiatives for the agency and support impact analysis capabilities.	Yes
<u>Modeling to Validate</u> : Providing logical application and data architecture enterprise design patterns to the architects to ensure that proposed solutions are applicable and reasonable to meeting the needs of the stakeholders.	Yes
<u>Modeling to Communicate:</u> Communicating the technical compliance requirements of the technical reference model relating to strategic technical decisions, services, standards, core competencies and evaluation guidelines.	Yes
<u>Modeling to Select:</u> Providing evaluation, integration and implementation frameworks to support the "BUY" strategy for COTS solutions.	No
<u>Modeling to Design:</u> Providing the system analysis and system design architecture components necessary to "BUILD" high-quality custom-developed solutions.	No

The two bottom dimensions in the table contain objectives that service much lower levels of the enterprise architecture framework (builder's and sub-contractor's views). These dimensions will be used to specifically address the approved development

strategy in the software development division (SDD). These dimensions provide the planner with models that typically help in making decisions pertaining to implementation and deployment issues of an IT project and not high-level enterprise architecture issues.

Modeling to Design is performed prior to and during the development and deployment of a system and can vary in the level of details based upon the magnitude of the project (i.e., ACE development).

Modeling to Select is performed prior to and during the evaluation and selection processes for buying a COTS or government-off-the-shelf (GOTS) system from a vendor (i.e., PeopleSoft/HR, QPAM).

Although Customs has provided some of these frameworks through its SDLC project guidelines, Software Process Improvement Plan (SPP) and the Process Improvement Strategic Action plan (PISAP), they are not currently considered to be within the scope of the EA effort.

The two following figures illustrate the five dimensions of the framework and how modeling objectives are assigned to each dimension,

The dimensions of the architecture are established by the combination of the roles, processes and information that it is intended to support.

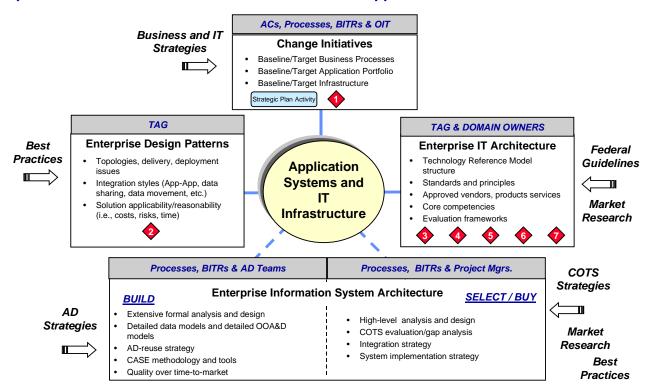


Figure 32: Modeling Dimensions—Defined as sets of roles, processes and information

Modeling strategies can then be aligned to those dimensions to ensure that we deliver sufficient content to support our architecture strategy.

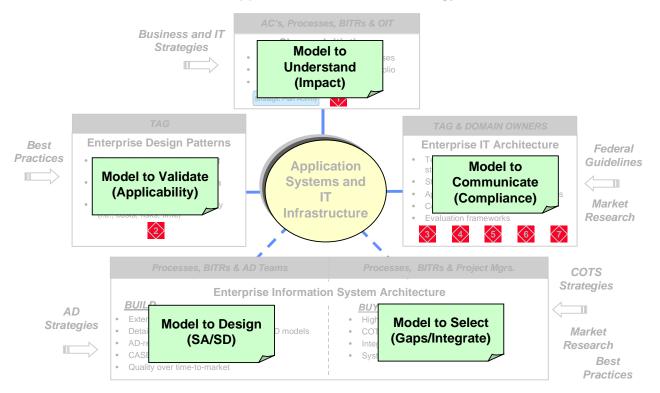


Figure 33: Modeling Dimensions—Aligned Strategies

## 3.5 MODEL TO UNDERSTAND

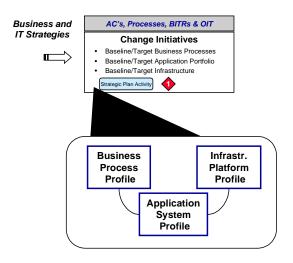


Figure 34. Model To Understand

The objective for this dimension of the architecture is to assess the impact that a change in the business process, application system and infrastructure has on the Customs IT environment.

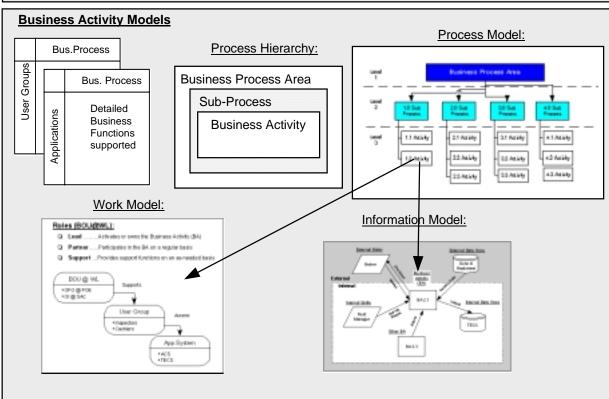
## **EA Profiles**

The EA modeling approach is concentrated around the integration of three primary profiles. Each profile relates various EA elements to describe the work/function/information/infrastructure views needed from a planner's perspective.

- Business Process Profile: Describes the organization structure, mission, vision, work roles, business processes and the information flows.
- Application System Profile: Describes the application systems functionality, classification, personnel/organization responsible for maintaining and the infrastructure that supports it.
- TRM Infrastructure Profile: Describes the principles, guidelines, platforms, components, sub-domains and product standards that have been established from the IT strategy.

## **Business Process Profile**

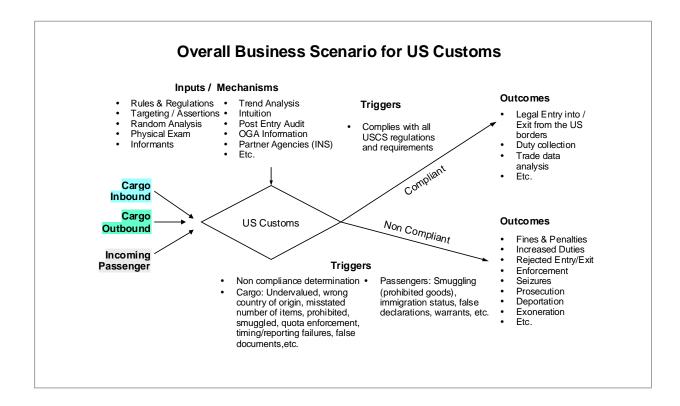




The business process profile describes the core and mission support processes in a hierarchical fashion. Customs uses a business process hierarchy structure (Business Process Area—Sub-Process—Activity) to describe the processes in a common format and provide linkage to the work and information models.

- The profile includes a description and the key point-of-contact, business scenario, strategic initiatives and the organization structure.
- The process hierarchy model introduces the business activity element that is central to the process, work and information models.
- The work and information models provide the linkages between the application systems, user groups, business operating units, work locations and key information framework elements.

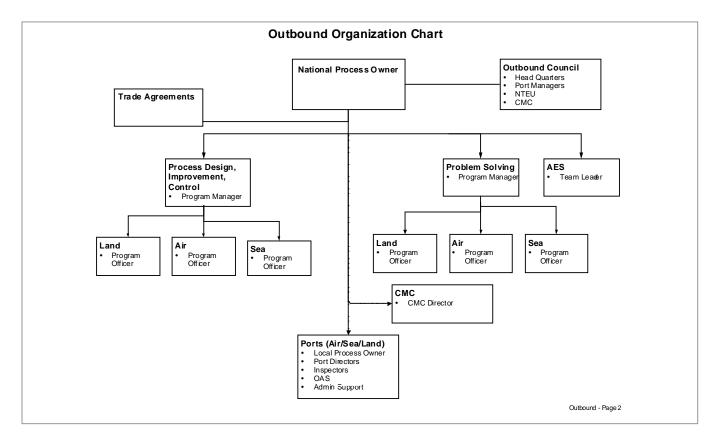
## **Business Scenario**



Business scenario is an integrated set of business processes that can cross multiple business operations. Terms used in describing the business scenario are:

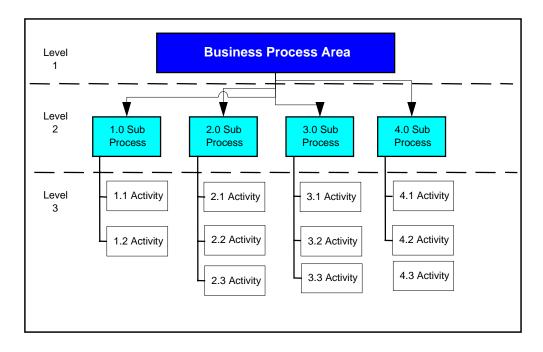
- Inputs: External event or inflow to the business process.
- Process: An individual or set of business processes that can cross multiple business operations.
- Inputs: Information used to perform the business process.
- Triggers: Events based on which the outcome is determined.
- Outcomes: Outflow from the business process.

# **Organization Chart**



The organization chart represents the various functional roles for each core and mission support process. The detailed roles and responsibilities are described in text format and captured within the repository asset.

## **Process Model**

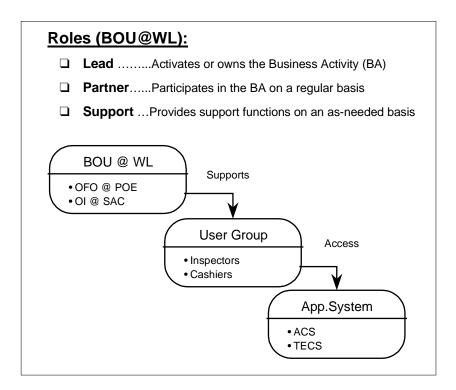


The process model shows the decomposition of each business process area (e.g., outbound, passenger) into sub-processes and business activities. This represents the level of mapping to which the Customs EA is modeled, utilizing the various modeling outcomes from the individual re-engineering efforts.

Each activity in Level 3 is formally profiled to indicate its relationships with the following elements: business unit, work location, user group, application system, external entity, other activities, data stores and key information using the work and information models.

The advantage of this model is that the key relationships that describe Customs business operations, inter-related functions, information needs and flows and supporting information systems are captured within the repository asset in a manner that is intuitive to the Customs business community and enables a wide array of reporting at an enterprise, business process or element level.

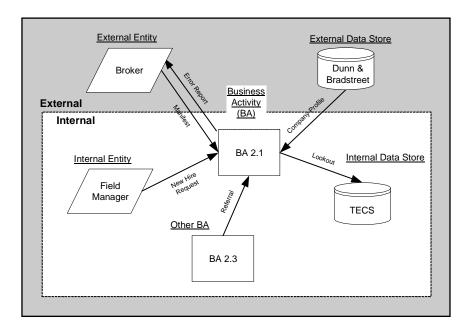
#### Work Model



The work model captures the relationship between the business operations and the supporting information systems. or each business activity the Business Operating Units (BOU), Work Locations (WL) and the role in the operations is mapped into the profile. User groups and application systems are mapped to these internal entities (BOU@WL) to indicate how the systems support the operations. Work roles (BOU@WL) can be one of three types—lead, partner or support. Definitions of key terms:

- Business Operating Units: Corresponds to the organization structure in Customs comprising the various offices of the assistant commissioners.
- Work Locations: Logical work locations have been classified to describe the locations within Customs where work is performed. Logical elements are used to represent areas in which groups perform similar work operations, regardless of the physical characteristics of the work sites.
- User Groups: User groups are defined as the units of workers that carry out the work and exist within the BOU structures.
- Application Systems: Information systems accessed by the user groups at work locations.

### Information Model

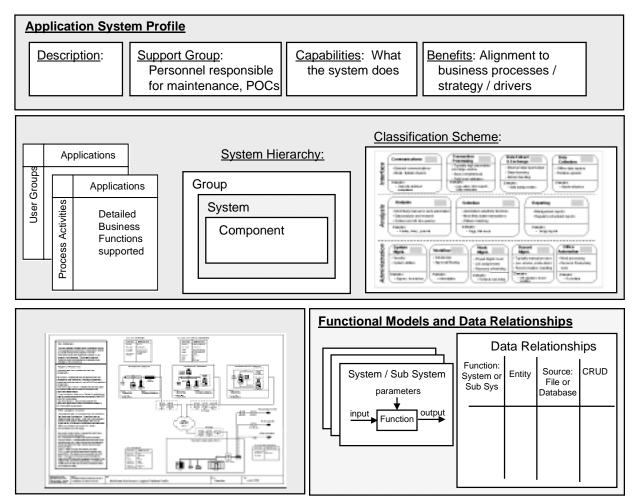


The information model describes the relationships that describe Customs inter-related functions and key information flows. For each business activity (BA) the external entities/ interrelated activities/data stores and the roles they play in the operations are mapped into the profile. Each relationship includes a description of the key information that flows across the BA boundary.

Customs has established various primary roles to describe these relationships and indicate the flow direction of the information that enters or exits the business activity.

- External entities (customers) describe parties other than the BOUs that participate within the operations of the BA. The entity participates in a provider (input), customer (output) or an advisor (informal) role.
- Other business activities describe inter-related BA that either provide (input) or receive (output) information flow.
- Data store describes sources that key information is written to or read from during the operations of the BA. (Secondary interrelations among other BAs that share information on a non-sequential basis would be supported via a data store.)

# **Application System Profile**



The application system profile describes the core systems in a hierarchical fashion. The profile includes a system overview description, key point-of-contacts, capabilities and the benefits associated with the system. The application structure depicts the system hierarchy (Group—System—Component) and the classification scheme at the component level. The IT architecture maps the system to a platform(s) and provides the linkage to the TRM infrastructure profile. The functional models represent the system as information and data entities. The current development effort for this profile has not been driven down to include these models.

The application systems are structured in a hierarchical tree:

Groups→System→Component. A classification approach has been employed to illustrate the types of processing, architecture and functions provided by each component of the system group family. This enables the planner to interpret functionality summaries at either the sub-system or group level.

# Application System Hierarchy Structure

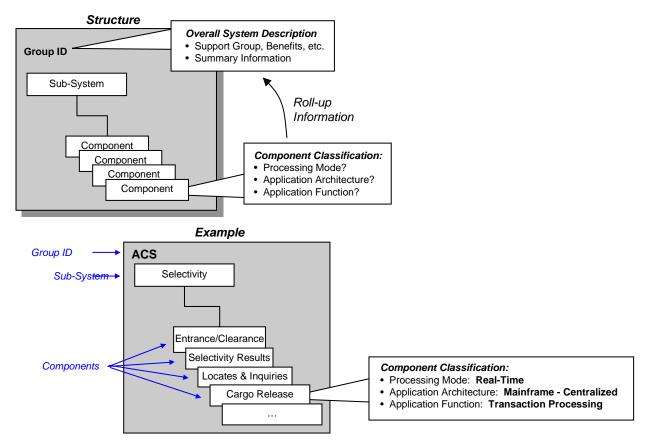


Figure 35: Application Hierarchy System Structure

Each Application System is broken into two levels of hierarchy: Sub-Systems and Components. Sub-systems are logical segments of the application (e.g., Selectivity), and Components are individual functional pieces (e.g., the set of COBOL programs for the Cargo Release function is one Component under Selectivity.)

An Application System can have any number of Sub-Systems defined, and each Sub-System can have any number of Components.

Components are further described through Classifications. Classifications are used identify processing modes (e.g., batch or real-time), architectures (e.g., mainframe or client/server) and function (e.g., reporting, analysis, transaction processing). The Component classifications can then be rolled up to provide a balanced view of the how the overall application system structure and capabilities.

**Table 2: Functional Classifications** 

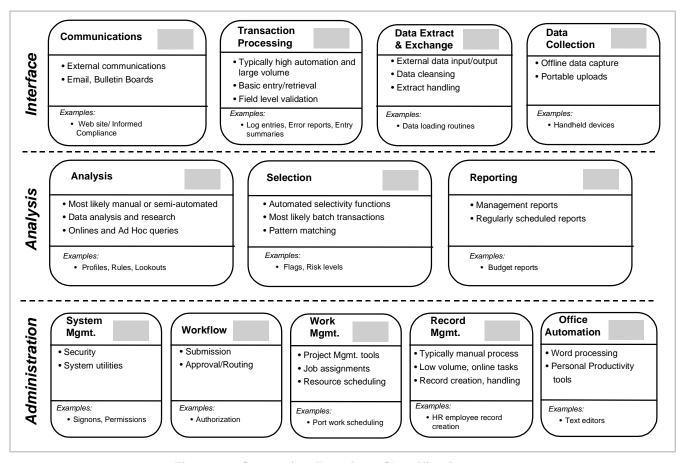
Category	Classifications	Description
Processing Mode	• Batch	These types of systems typically perform offline processes in scheduled or ad-hoc batch transactions.
	• Real-time	These types of systems typically perform online processes in a real-time environment with screen input and presentation.
	• Other	Please describe other modes that apply.
Application Architecture	Centralized	This type of architecture is typically centered around mainframe technology.
	Distributed	This type of architecture is typically distributed through client/server technology.
	• PC-based	This type of architecture is typically centered on a single standalone PC.
Application Function	Interface	These functions include communications, transaction processing, data exchange/extraction and data collection.
	• Analysis	These functions include analysis, selection and reporting.
(See Next Page for Additional	• Admin.	These functions include system admin., workflow, work management, record management and office automation.
Function Descriptions)	• Other	Please describe other functions that apply.

Twelve primary functional classifications have been defined to describe the computing functions that an application system component provides as illustrated below. These classifications are used to indicate the basic functions that an application component provides from a computing rather than a business function reference.

The business functions associated to an application are indicated by the application relationships mapped in the work models of the business process profile.

The twelve categories, illustrated in the next figure, each roll-up into one of the Interface, Analysis or Administration function groups described above.

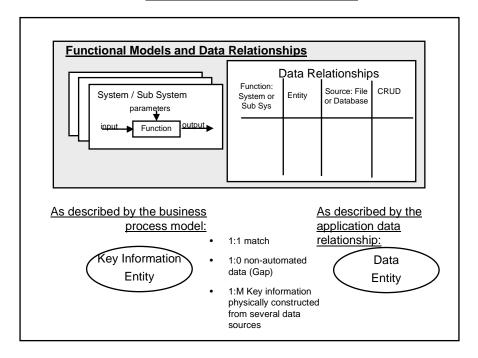
# **Application Function Classification Scheme**



**Figure 36: Computing Functions Classification** 

# Functional Models and Data Relationships

## **Functional and Data Models**



# **Centralized Data Stores**

March 1, 1999

	Databases	Tables	Keys	Rows	CButoo	
	Databases	(in Thousands)	(in Thousands)	(in Millions)	GBytes	
Development	1,482	7	17	75	250	
Testing	1,739	8	20	116	148	
Production	2,524	11	29	7,913	3,967	
Total	5,745	25	66	8,104	4,366	

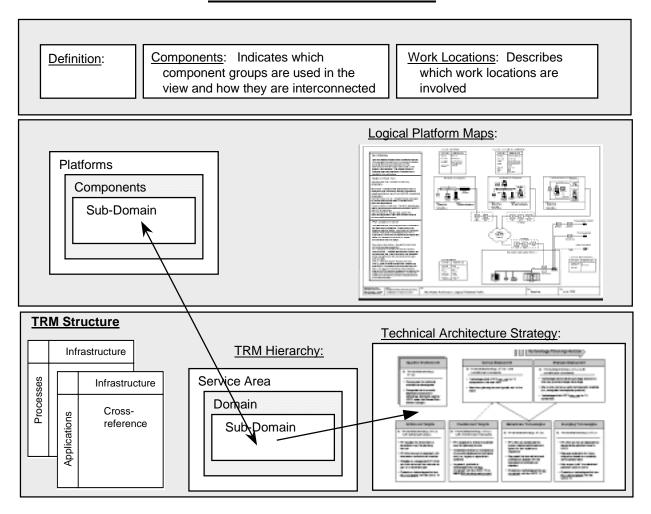
Similar to many other government and private industry legacy-centric environments, a complete set of functional and data models does not exist. While each application management team does maintain local collections of models for maintenance or enhancement purposes, the varying formats, semantics and perspectives make it extremely difficult to synthesize the information into a central repository.

Customs is currently in the process of evaluating the benefits and costs of developing functional models and data relationships for all the application systems within the EA framework. The characteristics of the functional and data environment include:

 The table provides a sense of the size and scope of the current information and data stores. Although the statistics below represent one of the most critical and centralized data stores, it is by no means the only data store. However, all other data stores are distributed and significantly smaller.  Employing a create, retrieve, update, delete (CRUD) matrix to model the relationship between tables and programs would require a master table of 2,600 columns, 12,000 rows and 35,000 cell values.

## Infrastructure Platform Profile

## **Infrastructure Platform Profile**



The infrastructure platform profile describes the various infrastructure views on which the core application systems are deployed. Each profile view (i.e., mainframe-centric, client/server and desktop) is illustrated on both an infrastructure map and as a collection of TRM component groups in the repository. Each platform is presented in the baseline and target states based on the composition of the underlying product strategies defined in the TRM. The structure and relationship of the components and platform are covered extensively in the next section: Model to Communicate.

# 3.6 MODEL TO COMMUNICATE

The objective for this dimension of the architecture is to communicate the requirements for "technical compliance" with Customs IT architecture. The primary components of this group of models include the following:

- the Technical Reference Model (TRM),
- the Technical Architecture principles, guidance and standards,
- and the infrastructure platform maps.

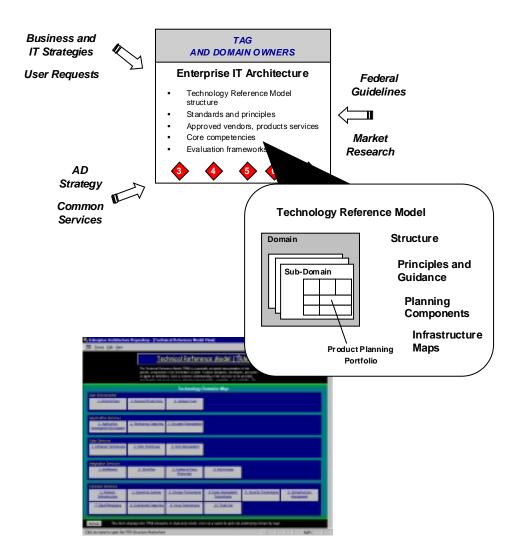
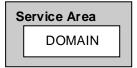


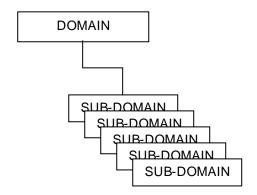
Figure 37: Model To Communicate

#### **Technical Reference Model**

The Technical Reference Model (TRM) is a TISAF-compliant approach for modeling the technical information of the EA. The TRM is a generally accepted representation of the generic components of an information system. It allows designers, developers and users to agree on definitions, have a common understanding of the services to be provided and identify and resolve issues affecting interoperability, portability and scalability.



Technology domains are defined as the primary classification level of the technology components of the TRM. Domains are defined for grouping and management purposes only.



Technology sub-domains comprise the domain groups and represent the categories to which definitions, standards, product standards, benefits, selection criteria and product planning portfolios are applied.

Figure 38: TRM Model Components

- The objective of a TRM is to provide a standardized component structure or model that can be used to guide the design, development and selection of both customized and COTS information systems that meet the specific business needs of Customs.
- The TRM describes the main components of a complete information system as a set of services categorized by functional area. These services may be implemented on a single component or on a collection of homogeneous or heterogeneous components.
- The TRM structure provides a framework for organizing, developing and implementing information systems, in general, and an infrastructure, in particular. Services and technologies are the principal components described by the TRM.

 The TRM also enables planners to define the information required to support both the IMP Project Assessment and Technology Architecture Management activities. This includes the principles and guidelines, technology service areas, applicable standards, selection criteria and target technical product/services portfolios.

# Technology Reference Model (TRM)—Service Areas Overview

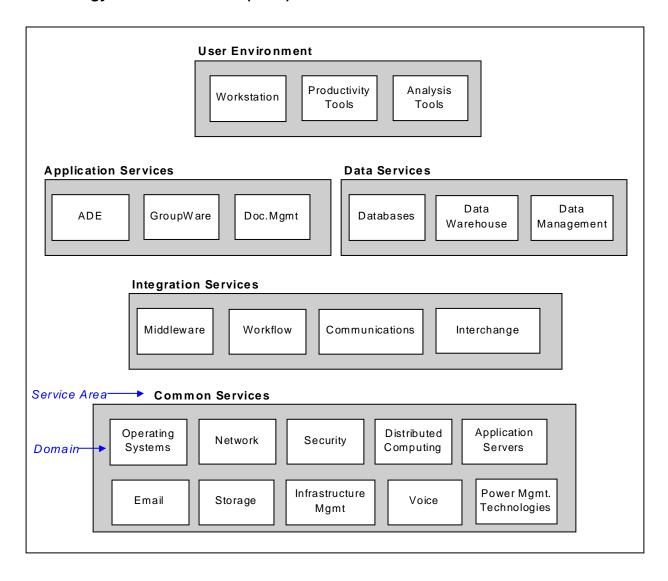
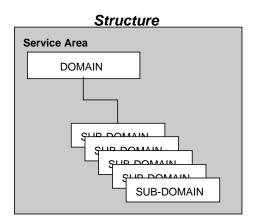


Figure 39: TRM Domain Structure

Service areas are groupings of similar domains. In the current scope of the TRM, they are used for easier visualization and management purposes only.

- The role of the service area will be expanded in the future vision as the solution architects are established.
- The TRM service areas for Customs have been structured as shown in the above diagram.
- The five main service areas with each containing groups of related domains are:
  - User Environment
  - Application Services
  - Data Services
  - Integration Services
  - Common Services.

#### TRM—Domain and Sub-Domain Structure Overview



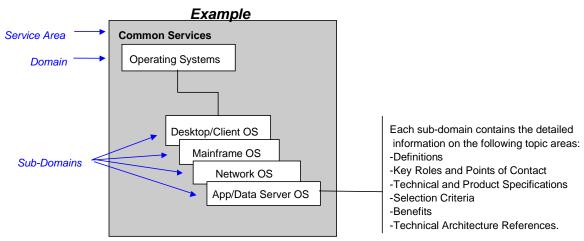


Figure 40: TRM Sub-Domain Structure

- Technology Domains are defined as the primary classification level of the technology components of the TRM. There are approximately two dozen different domains.
- All unique technology elements within the architecture are assigned to a domain and called **sub-domains**. The sub-domain is the actual technology category that contains the products, selection criteria, benefits and others topic areas used to make decisions and assess compliance.
- The domain structure is used primarily to logically organize all of the different sub-domains (approximately 75) for easy reference, management and navigation. A domain may contain any number of sub-domains.

# TRM—Sub-Domain Information Topic Areas Overview

The figure below illustrates the attribute information maintained for each Sub-Domain standard.

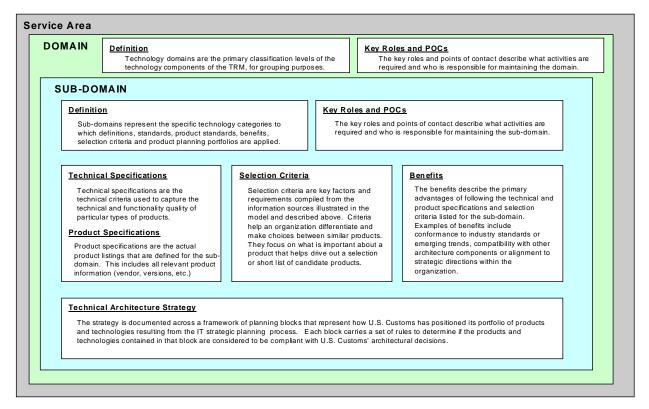
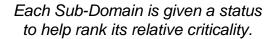
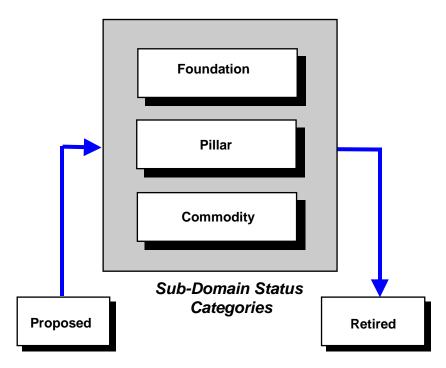


Figure 41: Sub-domain Attributes

# TRM—Overview of Ranking Sub-Domains by Status





- Not all of the many sub-domains have the same criticality or impact on the strategic direction and architectural decision-making. Trying to spend equal time and effort on all sub-domains would be short-changing some extremely important ones and overkill for others.
- Consequently, each sub-domain is given one of five possible "status" rankings to help identify its relative needs:
  - Foundation, Pillar, Commodity, Proposed, Retired.
- The Proposed and Retired statuses represent a key part of the sub-domain life cycle. As technology categories emerge or fade, these statuses are used to introduce or remove them from the TRM. For example, new intranet or Web subdomain categories of technologies could be proposed, and discontinued disk storage technology categories could be retired.
- The sub-domain status is merely an attribute that can be used to quickly sort all the sub-domains by criticality and verify that the architecture management efforts are focused first on the most important ones to Customs.

# TRM—Sub-Domain Status Definitions

Foundation	<u>Definition</u> A sub-domain with a Foundation status represents the highest level of criticality to the architecture. Foundation are the most important elements and have the largest impact across the enterprise.	Examples  • Enterprise DBMS  • OLTP  • Application/Data Server OS
Pillar	Definition  The Pillar sub-domains are built on top of the Foundation sub-domains.  They represent technologies with significant choice, consequences and implications based on the Foundation sub-domains.	Examples  • Web Browser  • Remote Access Server  • Data Transformation Tools
Commodity	Definition The Commodity status describes sub-domains that are not differentiated on the basis of strategic importance to the enterprise. They are seldom changed, and although vital to maintain, their selection does not have significant architectural implications.	Examples  UPS Network Interface Cards
Proposed	Definition  The Proposed status serves as a placeholder reserved for future sub-domains that are in development or are emerging but not yet populated.	Examples  • Workflow Applications  • Document Management
Retired	Definition  The Retired status represents a sub-domain that is being phased out of the architecture. This could be due to changing or obsolete technologies or consolidation with other domain elements.	Examples  • Consolidation of telephone sub-domains

Figure 42: Sub-Domain Status Definitions

# Technology Planning Horizon Today 1 -2 Years Beyond 2 Years Baseline **Tactical** Strategic Environment Environment Environment Retirement Containment Mainstream Emerging **Technologies Technologies Technologies Technologies** Life Cycle for Products **Products Products** Removed Introduced

# TRM—Sub-Domain Planning Strategy Overview

Figure 43: Sub-Domain Planning Strategy Overview

- For each sub-domain, a planning strategy is developed outlining how the products and technologies for the given sub-domain technology are going to be utilized.
- The Sub-Domain Planning Strategy answers the question of how the different products and technologies for a sub-domain are being used by Customs. The approved roles for products within sub-domains enable the assessment of technical compliance.
- The Technology Planning Horizon shows the strategic direction from the current baseline environment as compared to where it is going in the short- and longerterm future.

- The Life Cycle for Products shows the evolutionary applicability of the products and technologies (P/Ts) within the sub-domain.
  - New P/Ts begin as Emerging Technologies and potentially become Mainstream Technologies that are used for the Tactical and Strategic deployment within the organization.
  - As P/Ts are excluded from mainstream deployment and usage, they can either migrate to Containment (support existing usage but allow new usage only with certain conditions) or Retirement (remove from the environment entirely).

## TRM—Sub-Domain Planning Strategy Definitions

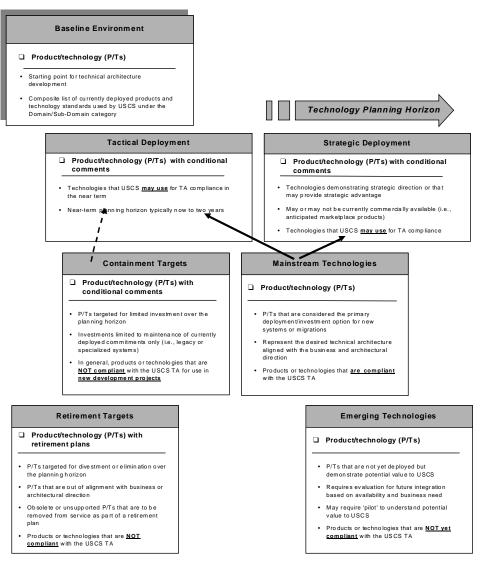


Figure 44: Sub-Domain Planning Strategy Definitions

# TRM—Overview of Building the Components

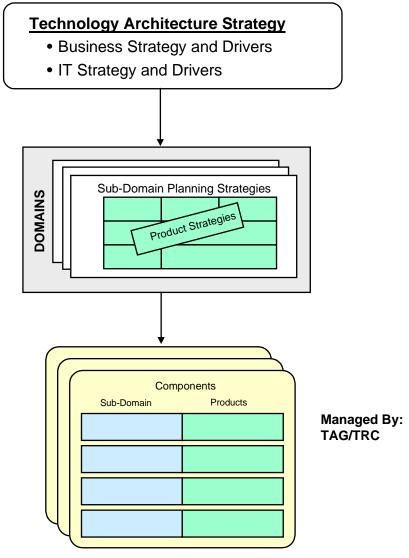


Figure 45: TRM Components

- After the sub-domain planning strategies have been defined, it is possible to begin using them for technical compliance assessment. For example, are the products selected to build a new proposed system the ones that are mainstream products identified as tactical or strategic for Customs? If not, were the proper exception processes followed for usage of a contained product?
- The sub-domains can also be used for building blocks to aid project planning. Components are constructed to represent a set of sub-domains that are used together to build a functional component, such as a database server. Components make it easier to navigate all the sub-domains needed to accomplish a task or build a system.

- These components are especially helpful for new projects that are proposing specific technology architectures (for example, mainframe or client/server architectures) because they provide all the relevant sub-domains grouped into complementary building blocks.
- Instead of project teams trying to track down each individual sub-domain they
  could use ("Do we need to include selections from all of the operating systems'
  sub-domains?"), they can select the components needed to accomplish their
  project ("We will have a database server and an application server and client
  PCs.").

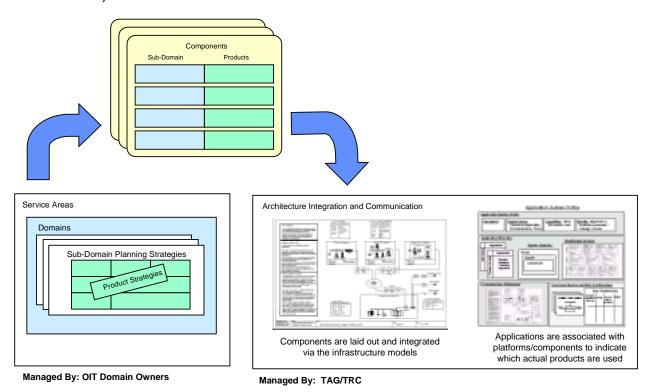


Figure 46: TRM relationship with Infrastructure Maps

- Once the components (and the sub-domains included) have been defined, they
  can be used by TAG and the TRC to track applications and actual products that
  are being used. Infrastructure maps can also be developed to show how
  applications and IT are used and impacts of strategic directions [for example,
  Transmission Control Protocol/Internet Protocol (TCP/IP) deployment].
- The OIT domain owners can also more easily assist project planning by providing the standard components as building blocks and monitors projects for compliance.

#### Example Service Area **Common Services** Operating Systems Domain Desktop/Client OS Mainframe OS Sub-Domains -Network OS App/Data Server OS **Example Components** (Functional Collection of Sub-Domains) Components: Database Server App/Data Server OS Planning Strategy Baseline Tactical Strategic App/Data Server OS NT, Solaris. Sub-Domain Planning Strategy Product Strategies CA-Da Enterprise DBMS DBMS Gateways Oracle APPC. Database Mgmt. Tools Oracle Toolset Message Oriented

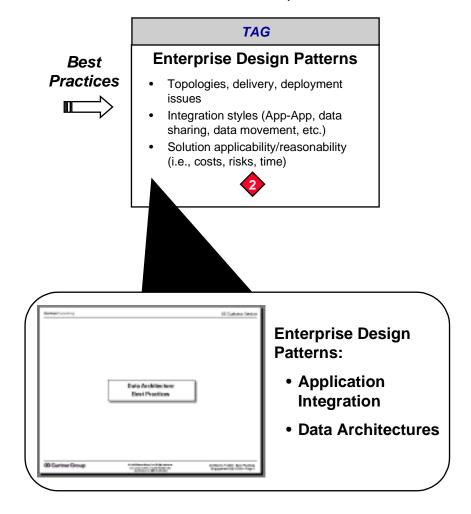
# Technology Reference Model—Summary

Figure 47: TRM Summary

- The TRM describes the main components of a comprehensive IS architecture so that conformance expectations and technical compliancy standards can be communicated across the enterprise. The structure provides for evolving technology categories as well as product changes within a category.
- The TRM also enables planners to communicate and manage the elements of the technical architecture in an easy-to-navigate structure with useful component building blocks. This includes the technology service areas, applicable standards, selection criteria and target technical product/services portfolios.

## 3.7 MODEL TO VALIDATE

The objective of this dimension is to ensure that the proposed solution is applicable and reasonable within the context of the Customs Enterprise Architecture.



An initial set of industry best practices material relating to enterprise design patterns for application integration and data architectures has been developed to guide the architect during the business case solution assessment process.

The practices present the common topology patterns that GartnerGroup has identified for partitioning and targeting both data and processes across enterprise applications. Characteristics, recommendations and limitations are presented for each pattern. These practices are not intended to be an exhaustive set of rules for designing and deploying applications; rather, they should be used to guide the architect to ask the appropriate questions early in the solution development to ensure that the approach is reasonable for the environment and applicable to meeting the needs of the users, process area(s) and OIT.

## 3.8 Model to Select and Model to Design

The objective of these dimensions is to address implementation and deployment issues to support "Buy" and "Build" strategy.

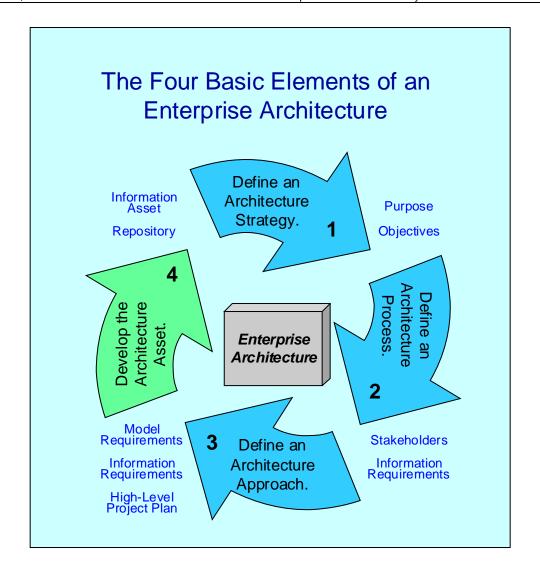
The last two dimensions of the modeling strategy service are much lower levels of the framework (builder's and sub-contractor's views). These two dimensions will be used to specifically address the approved development strategy in the software development division (SDD). The approved products from the TRM will be used to make both build and buy decisions. The two models are as follows:

- Model to select: Providing evaluation, integration and implementation frameworks to support the "BUY" strategy for COTS solutions.
- Model to design: Providing the system analysis and system design architecture components necessary to "BUILD" high-quality custom-developed solutions.

These dimensions provide the planner models that help in making decisions pertaining to implementation and deployment issues of an IT project and not high-level enterprise architecture issues. Modeling to design is performed prior to and during the development and deployment of a system and can vary in the level of details based upon the magnitude of the project. Modeling to select is performed prior to and during the evaluation and selection processes for buying a COTS or government-off-the-shelf (GOTS) system from a vendor.

Customs has provided some of these frameworks through its SDLC project guidelines, Software Process Improvement Plan (SPP) and the Process Improvement Strategic Action Plan (PISAP).

# 4 DEVELOP THE ARCHITECTURE ASSET



# Key Issues:

- How do we populate the framework, models and information to create the information asset?
- How do we present the information in a usable form?
- How do we ensure that the architecture has done what it is intended to do?

# 4.1 OVERVIEW

This section presents the information relating to the architecture that defines it as the strategic information asset base. The asset represents the collection of content that has been collected based on the architecture modeling approaches described in the previous section. This collection represents content stored in the enterprise architecture (EA) relational database tool, visual models, narrative documentation in the EA architecture document (release 1.0), materials on the strategy, processes and approach

contained in the EA blueprint. An objective during Phase 4 of the EA effort has been to move much of the narrative and visual models first contained in the architecture notebook document and embed them into the repository tool. This provides a fuller understanding of the business processes by including the enterprise level missions, business scenarios, organization charts, and workflows tied to the business process profiles. A similar effort has been conducted with the application and technology profiles to locate all of the relevant information for a profile in the repository. This supports the principle of centrally locating the architecture information and universally sharing it across enterprise in a coordinated and manageable form.

The principles employed in the development of the current asset include:

- Capturing the essential and usable information required to meet the objectives of the architecture in a format that is navigable, updateable and extensible.
- Capturing the information at a consistent and relate-able level across the enterprise.
- Utilizing characterization and classification schemes to reduce complexities and uncover usable distinctions.
- Providing definition, clarity and tractability.
- Continually incorporate Treasury Information Systems Architecture framework (TISAF) guidance:
  - "To characterize means to describe as succinctly as possible the current state of computer-based automated support for the enterprise's business operations. Detailed, definitive architectural descriptions for the baseline architecture are not needed. Enough information is required to determine what information systems and data an organization has in order to plan for what it needs."

## 4.2 CURRENT ASSESSMENT

The current assessment presents a snapshot of the accomplishments within the EA effort at Customs relating the development of the architecture content and information asset.

- The current repository asset contains a complete baseline perspective for all enterprise business processes, enterprise application systems and enterprise infrastructure platforms based on the existing EA approach models.
  - The primary TISAF framework elements have been defined as distinct mapping entities.
    - » External entities (a.k.a., Customers) = 78
    - » Business operating units (a.k.a., Offices) = 13
    - » Logical work locations = 25
    - » User groups = 40
    - » Key personnel = 61

- » Business process components = 80
- » Application system components = 280
- » Key information objects = 260
- » Data stores = 50
- » Technical reference model (TRM) service areas = 5
- » TRM domains = 24
- » TRM sub-domains = 79
- » TRM products = 195
- » TRM Platforms = 6
- » TRM Components = 11.
- The baseline architecture is complete for all core and mission support processes.
  - » Over 1,000 relationships have been mapped between the primary elements to describe the business architecture profiles in terms of the work they perform, the application systems they use and the key information that they require or produce in the execution of that work.
  - » Each core and mission support process includes an enterprise profile record containing its mission, business scenario model, organization structure and process structure.
  - » Target business profiles views have been constructed for the Trade Compliance core process and the Human Resource Management mission support process based on the outcomes of their business process improvement efforts.
- The baseline is complete for all primary enterprise applications.
  - » All primary enterprise applications have been completely profiled and classified.
  - » A small collection of secondary applications still need to have an owner identified and assessment conducted. Several of these systems may in fact not be considered enterprise applications or may be re-assigned to one of the existing primary system hierarchies as a sub-system or systemcomponent.
- The baseline infrastructure platforms have been completed for the mainframe, distributed and desktop environments.
  - » Each platform view is represented on both a logical visual diagram and in the repository as a collection of components. The repository profile enables the user to view the collection of components from various perspectives based on the underlying sub-domains; therefore, a component can be described as a composition of either the baseline, target or strategic products.
  - » An intranet/Internet platform has been developed based on the WAG recommendations.

- » Lotus Notes has been selected as the messaging platform.
- » A voice platform is currently under development.
- Each platform is composed of the key TRM components—comprised of collections of sub-domains—that are linked together to provide the system infrastructure to support the processing and deployment of the enterprise application systems.
- The technical reference model has been renewed.
  - The product portfolio has been updated to reflect the current product and technology selection strategies for Customs.
    - » Customs target technical architecture (TA) is represented by the product sets defined in the tactical and strategic planning blocks.
- The TRM structure was rationalized to retire unnecessary sub-domain elements and roll up low-level distinctions into summary groups (i.e., mainframe ADE contains internal distinctions for language, third-generation language (3GL), thirdgeneration language (4GL) and reporting tools, rather than individual breakouts).
  - » Current sub-domain breakdown—foundation (22), pillar (30), commodity (3), proposed (21) and retired (45).
  - Implication of DB2 and IP network to the TRM target architecture.
    - During the technical architecture renewal workshop conducted on 2-3 June 1999, the TRC members and domain owners identified sub-domain standards (i.e. DBMS gateways, routers, switches, etc.) that have been selected with the assumption that the IP network and the migration to DB2 on the mainframe will happen in the tactical timeframe. These standards have been documented and the implications noted within the TRM structure, but these migrations will need to be tracked to ensure that the tactical decisions captured in the TRM are not invalidated by slippage in these migration strategies.
    - » These implications have far-reaching effects that currently constrain the development and deployment of new application systems on the intranet/Web platform.

# 4.3 Enterprise Architecture repository Overview

# **Basic Enterprise Architecture Repository Composition**

The EA Repository contains information that describes the baseline and target architecture environments.

- The EA consists of two pictures or snapshots of Customs: "Baseline As-Is" and "Target To-Be"
- This collection of architecture views describes the interactions between the business operations, the business users, the information systems and the technology infrastructure (i.e., networks, hardware, and protocols).
- These pictures or snapshots are developed under a time-phased approach so as to illustrate what differences will occur in the environment due to changes in the business and/or infrastructure.

Where/what Customs is today... ...and where/how Customs plans to change into the future.

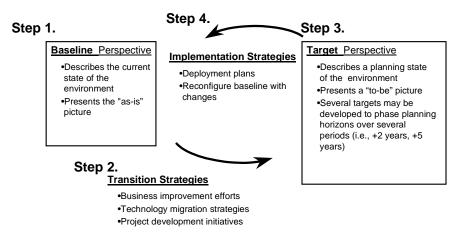


Figure 48: Baseline and Target Perspectives

# **Enterprise Architecture Repository Perspectives**

The level of detail contained in the EA is oriented for the planner's and owner's perspectives. The EA views are developed by assembling key information contained in project-specific work products to create an integrated high-level view of the enterprise based on its strategies, organizations, processes, applications, information and infrastructure.

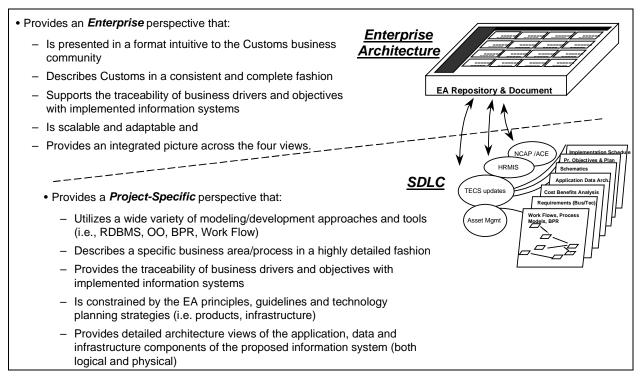


Figure 49: EA Repository Perspectives

# **Enterprise Architecture Repository Tool**

The repository's role is to encourage and enable reuse by documenting the existence and characteristics of reusable artifacts and providing search mechanisms to potential users. In other words, the catalog or repository is a database containing an enterprise's metadata, plus an access and reporting mechanism for that database. The Customs EA repository, as described in this document, exists as a catalog of the metadata (elements), characteristics and relationships that combine to describe the planners' and owners' views of the enterprise. This metadata describes data about the enterprise (i.e., processes, organizations, applications and infrastructure) and should not be confused with the metadata from the Enterprise Data Warehouse project that describes data from within the enterprise (i.e., transactional data, summary data, case management data, etc.).

The current collection of EA models contained within the Access97 repository tool are represented by either embedded visual diagrams (i.e., MS PowerPoint97 or Visio 5 formats) or as structured components of the repository application (i.e., graphical user interface screens with point-and-click automation over a data model built from the TISAF entity-relation architecture enterprise model). While this approach precludes features such as drop-and-drag construction, free-form diagramming, or object-oriented modeling associated with a standard visual modeling tool, it has enabled the Customs architecture team to quickly apply a rapid application development (RAD) approach to assemble a complete baseline and target<sup>1</sup> set of interrelated views describing the

4

<sup>&</sup>lt;sup>1</sup> For areas that have developed an articulated target strategy.

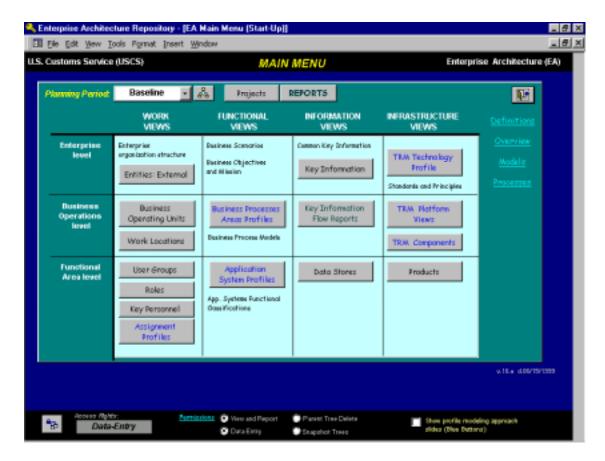
Customs enterprise from a wide variety of information resources within Customs business and technology organizations. This information is completely self-contained within a single Customs Access97 application that provides the user with a set of secure, intuitive interfaces to manage and to navigate information within the model pertinent to their area of influence. The information contained in the repository's relational model is completely accessible for querying and reporting via either the Access97 Reports design environment, MS Excel or any ODBC-based reporting tool. The architecture team has developed a core set of configurable reports within the application, based on the recommendations from Customs personnel, the TAWG and GAO.

It is appropriate to note that the definition of a repository can take on as many interpretations as that of an architecture. The given role assigned to a repository for a given organization must be defined based upon the specific objectives of that organization; only areas where there is adequate funding and commitment should be viewed as "real" and able to be fulfilled.

The more common roles a repository may play for an organization can vary from a mere data dictionary function to a most highly leveraged one such as that one of a reuse-enabling mechanism. Metadata stored in the repository is commonly referred to as "objects," "subjects" or "artifacts." Based on the modeling objectives these reusable artifacts can include: application frameworks, application templates, object class libraries, design components (e.g., data, process and business models), executables (e.g., distributed network architecture—DNA—components), source code, packaged applications, test scripts and files. Many of these roles are better aligned to support the objectives set in the modeling to build or to select dimensions of the Customs modeling framework. Therefore they are considered to be areas for potential future development within the Enterprise Architecture framework.

## 4.4 ENTERPRISE ARCHITECTURE REPOSITORY COMPONENTS

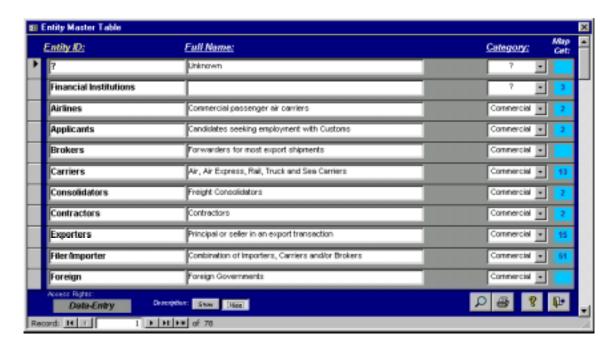
The remaining sections from this chapter present key illustrations from the repository tool describing the how the approach models are represented as user interface screens within the application. Following each of the three primary profile sections a summary table is presented indicating the number of objects and relationships contained within the repository models.



# **EA Repository Main Menu: Framework Representation**

- The EA Repository has been currently developed in Microsoft (MS) Access.
- Customs is in the process of developing an enterprise deployment strategy (centralize vs. decentralize) which will significantly influence the product(s) that will be used to develop the repository asset.
- The Figure above shows the layout of the screen that relates to the 16-cell TISAF model. This is the main screen from where all the inputting and reporting functions are performed for the baseline and target periods.
- The Repository can be accessed in three different modes—Read Only, Data Entry and Administrator.

# **Entity Master Table**



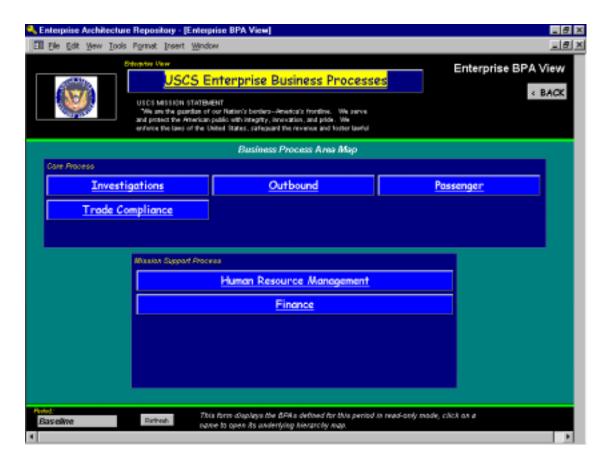
- The Entity Master Table presents a complete listing of the content within each EA element identified for mapping purposes.
- This is the form from where new entries are input into the repository.
- Entities within the repository are:
  - Business Operating Units
  - Work Locations
  - User Groups
  - External Entity
  - Roles
  - Key Personnel
  - Key Information
  - Data Stores
  - Products.

# **Key Personnel Role Assignments**



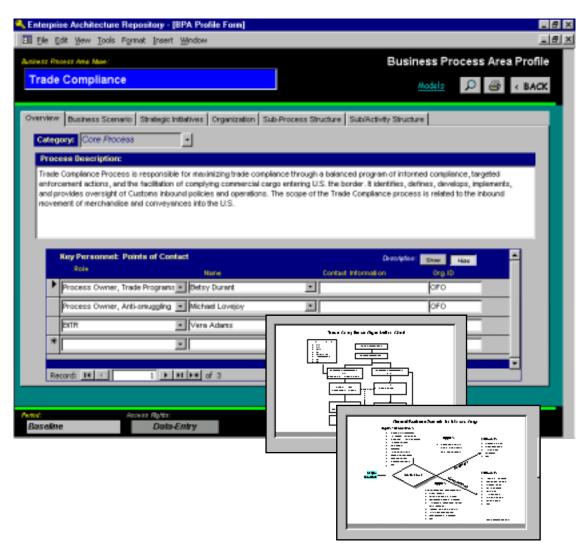
- Key Personnel Role assignments provide a snapshot of the list of functional roles cross-referenced to the list of profiles for key point of contacts.
- List of functional roles mapped in the repository include:
  - Process Owner
  - Application Team
  - Domain Owner
  - Subject Matter Expert.
- List of profiles mapped in the repository are:
  - Business Process Area
  - TRM Domain
  - TRM Sub-Domain
  - Application Group.

# **Enterprise BPA View**

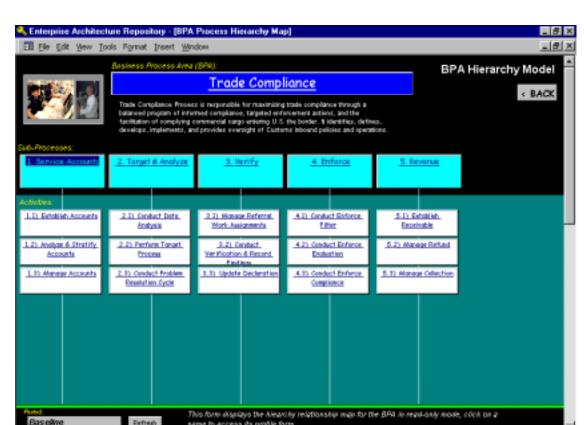


- The Enterprise Business Process Area (BPA) View shows the link to the Enterprise Process profile and the links to the BPAs (core and mission support) within Customs.
- Clicking on one of the BPA links (e.g. Outbound) displays the process model for the particular process
- The BPAs mapped in the repository are:
  - Investigations
  - Outbound
  - Passenger
  - Trade Compliance
  - Human Resource Management
  - Finance.

## **Business Process Area Profile**



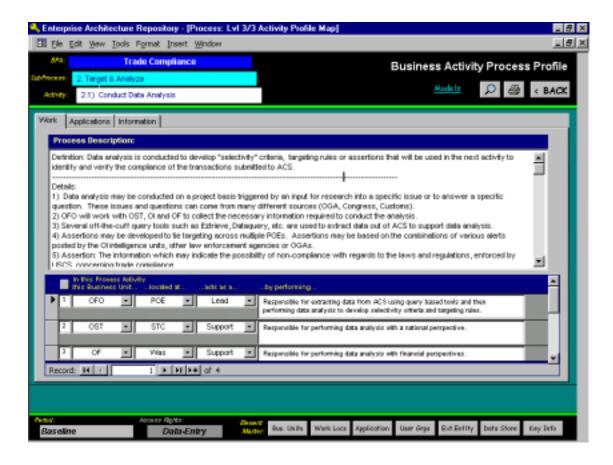
- The Business Process Area Profile shows the mapped properties for each core and mission support process. The profile includes:
  - Overview (Process description, Key Points of Contact including Name, Contact Information and the Organization)
  - Business Scenario
  - Strategic Initiatives
  - Organizational Chart
  - Sub-Process Structure
  - Sub-Activity Structure.
- The Business Scenario and Organizational chart are captured using text and embedded pictures as shown in the inserts.



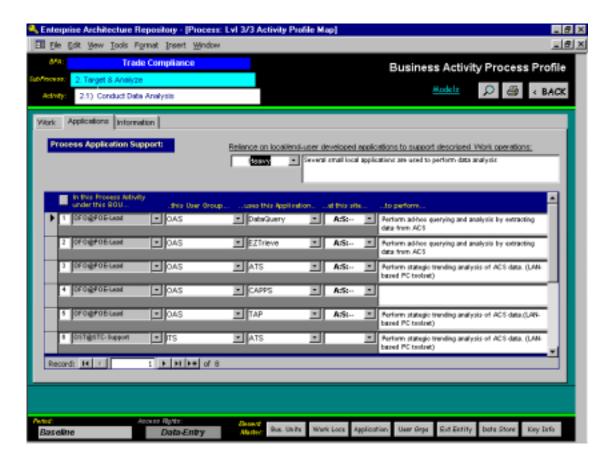
## **Business Process Profile—Hierarchy Model**

- The BPA Hierarchy Model shows the process model with the decomposition of each business process area (e.g., Trade Compliance, Passenger) into subprocesses and business activities.
- The work and information models for each of the activities can be accessed by clicking on the business activity links.

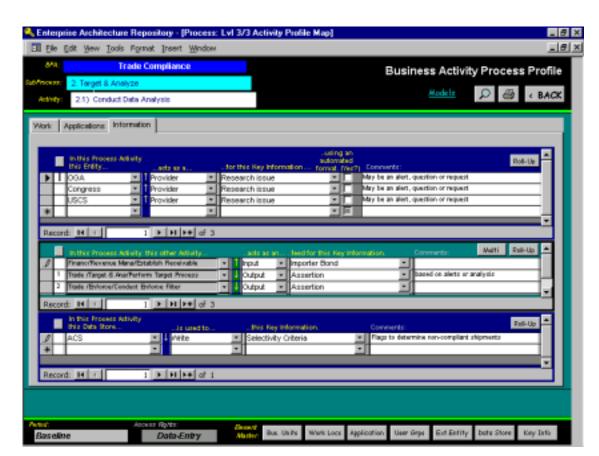
#### **Business Process Profile—Work Model**



- The Business Activity Process profile shows the work and information models for each business activity within a business process area. There are three forms for entering the information. The first form (Work) shown here captures part of the work model. Fields within this form are:
  - Process description: Definition and the detailed information for the business activity
  - Business Operating Unit: ACO office in Customs (OFO, OF, OI)
  - Work Location: Logical work locations the locations within Customs where work is performed (POE, CMC, SAC)
  - Role: Work Role (BOU@WL) in performing the activity. Work Roles (BOU@WL) can be one of three types:
    - » Lead: Activates or owns the process
    - » Partner: Participates in the process on a regular basis
    - » Support: Provides support on an as-needed basis.



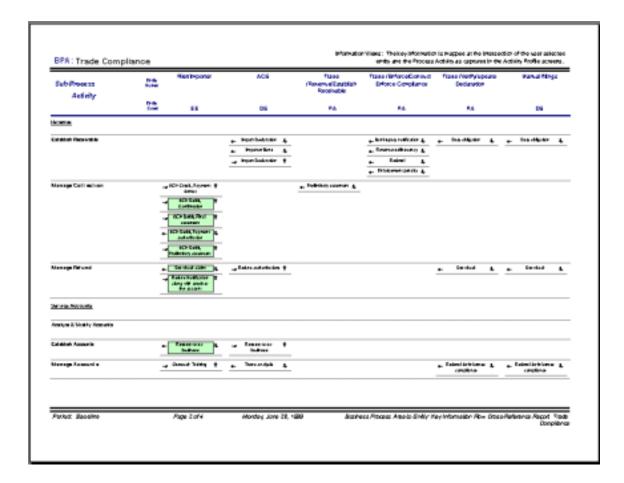
- The second form (Applications) shown here captures the rest of the work model and establishes the relationship between BOU@WL, User Group and Application System. Fields within this form are:
  - Process Application Support: Level to which the listed application systems support the business activity, ranging from Total to Minimal support
  - BOU@WL: Carried over from the Work form
  - User Group: The units of workers that carry out the work and exist within the BOU structures (Cashier, Inspectors)
  - Application System: Information system accessed by the user groups at work locations (ACS, AES, ABI)
  - Site: If a further distinction needs to be made at the ports (Air, Sea, Land).



#### **Business Process Profile—Information Model**

- The third form (Information) within the BPA Profile captures the information model and establishes the information flow between External Entities/Activities/Data Stores and the roles they play in the operations are mapped. Fields within this form are:
  - Entity: External Entities (customers) that participate within the operations (Importer, Congress):
    - » Role: Advisor, Customer and Provider
    - » Key Information: Information being exchanged
    - » Automated Format: Is it being exchanged electronically (Yes) or manually (No).
  - Activity: Other activity information exchange:
    - » Role: Input and Output
    - » Key Information: Information being exchanged.
  - Data Store: Automated sources of information:
    - » Role: Read and Write
    - » Key Information: Information being exchanged.

#### **Key Information Flow Report**



- The figure shows a sample key information flow report. The row headers list the
  activities and the column headers list the various elements interacting with the
  activity (External Entity, Other Activity, and Data Store). The planner using the
  repository has the option to choose the elements to be viewed.
- The Key Information is captured as the content within the matrix. Arrows indicate inward and outward flow. When the information flow has no direction (Advisory role) the key information is shown in a highlighted box.

## **Business Process Profile Summary**

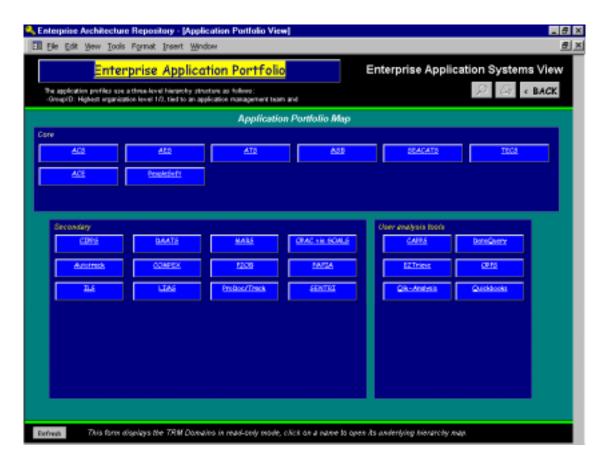
The following table summarizes the business process hierarchy structure and the profile mapping results for the BPAs. The counts in each column indicate how many unique elements have been associated with the BPA from either the functional hierarchy model, work model or information model (i.e., four unique internal business organizations have been identified as participants in the Trade Compliance process).

The right-hand shaded column in each view—work, function/application, and information—indicates the number of relationships that has been modeled in the repository to describe the BPA within the perspective of that view.

Baseline Business Profile Modeling Summary

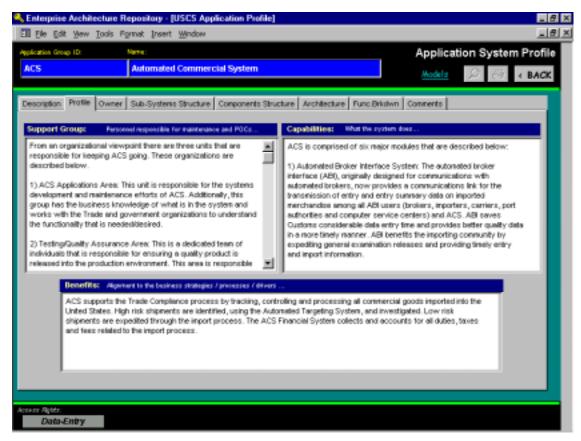
	Stru	cture	re Work		Functi	on/Appl	ication		Information			
Business Process Area	Sessesou4-qnS	Activities	Unique Business Organiz ation Elements	Unique Work Location Elements	Bus.Org and Work Location Relationships to Process	Unique User Group Elements	Unique Application Group System Elements	User Group and Application Group Relationships to Process	Unique Key Information Objects	Unique External Entity Elements	Unique Data Store Elements	Key Information Relationships with the Process
Trade Compliance	5	15	4	9	28	13	10	68	58	6	7	99
Outbound	4	14	4	13	45	9	5	60	44	11	11	123
Passenger	4	14	3	5	24	8	6	24	43	19	12	87
Investigations	1	10	3	6	17	5	5	28	22	27	8	57
Finance	2	11	6	7	25	10	8	71	50	10	8	104
Human Resource Management	6	16	5	5	33	7	8	74	50	13	14	182

## **Enterprise Application Systems View**



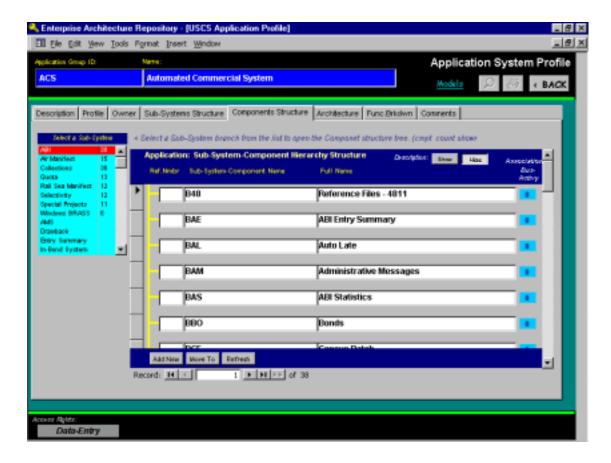
- The Enterprise Application Systems view provides the link to the Enterprise Application Portfolio and the links to the individual application system.
- Application System Groups are classified as Core (ACS, AES), Secondary (CIPPS, COMPEX) and User/Data Analysis (CAPPS, Qik-Analysis).

#### **Application System Profile**

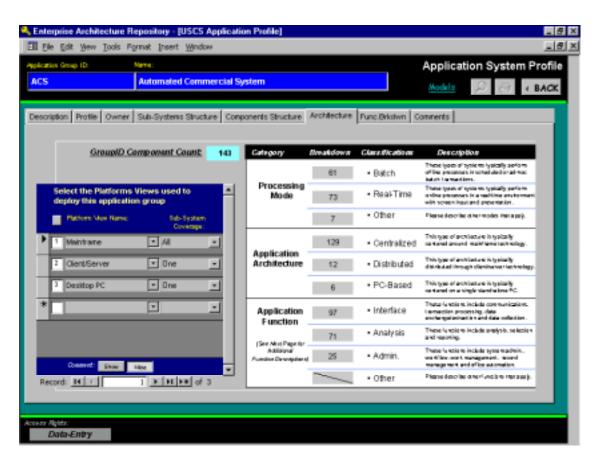


- The Application System Profile includes the following:
  - Description
  - Profile
  - Owner
  - Sub-Systems Structure
  - Components Structure
  - Architecture
  - Functional breakdown
  - Comments.
- The figure shows the profile form. Fields within the form are:
  - Support Group: Personnel responsible for maintenance of the system
  - Capabilities: Functionality provided by the system
  - Benefits: Alignment to the business strategy.

# **Application System Profile—System Hierarchy Model**

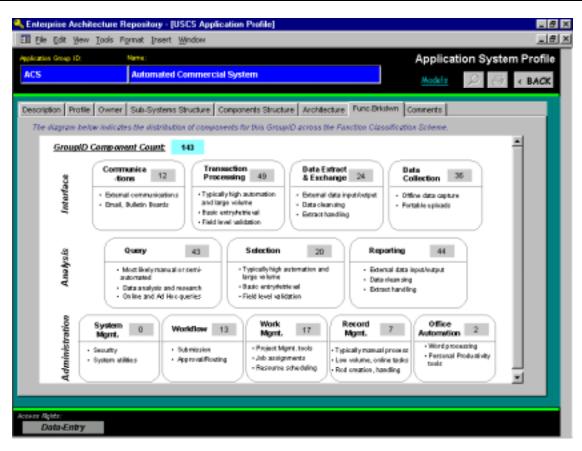


- The Components Structure form shows the Application system hierarchy (Group→Sub-System→Component).
- Moving components from system to system and adding new components are performed from this form.



### **Application System Profile—Application Structure**

- The figure shows the architecture form that provides the capability to tag the subsystem to a platform view (i.e. Mainframe, Client/Server, and Desktop PC).
- The form also provides a snapshot of the classification scheme for the application system showing the count of the number of components within each type of classification. The three categories of classification are:
  - Processing Mode
  - Application Architecture
  - Application Function.



- The figure shows the Functional Breakdown form, which shows the application function classification scheme.
- The application classification scheme has three classifications which are further broken into sub-classification as follows:
  - Interface
    - » Communications
    - » Transaction Processing
    - » Data Extract & Exchange
    - » Data Collection.
  - Analysis
    - » Query
    - » Selection
    - » Reporting.
  - Administration.
    - » System Management
    - » Workflow
    - » Work Management

- » Record Management
- » Office Automation.

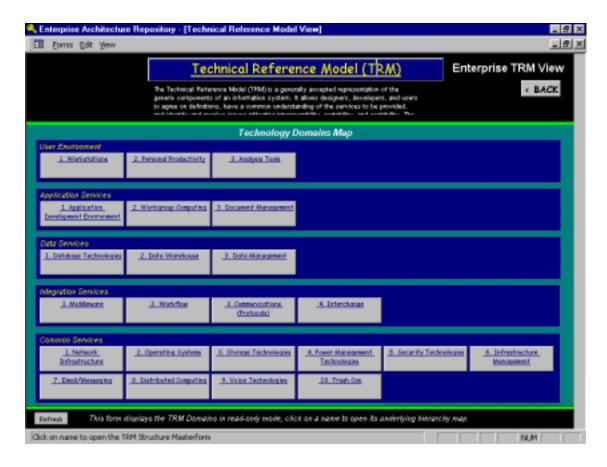
## **Application System Profile Summary**

The following table summarizes the application hierarchy structure and function classification results for the core system groups. The counts under mode, architecture and function indicate how many of the system-components, from the group, have been identified as demonstrating the column attribute.

#### System Component Function Classification

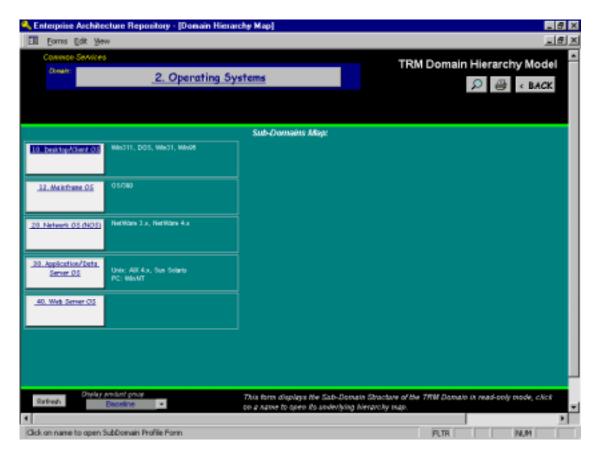
		Structure			Mode			Architecture			Function		
GroupID (Core Systems)	Name	Smets/S-duS	Components	Batch	Real Time	Other	Mainframe - Centralized	Distributed (C/S)	PC-Based	hterface	Analysis	Administration	
ACS	Automated Commercial System	15	143	61	73	7	129	12	6	12	97	71	
AES	Automated Export System	8	60	8	52	0	52	0	0	3	52	46	
ATS	Advanced Targeting System	2	9	4	5	0	0	9	0	0	0	0	
MSB	Mgmt Systems Branch	8	86	44	62	0	50	20	4	4	51	63	
SEACATS	Seized Asset and Case Tracking System	1	7	2	7	0	7	0	0	0	7	6	
TECS	Treasury Enforcement Communication System	20	60	24	49	0	60	0	0	44	44	23	

## **Enterprise Infrastructure Platform Profile View**

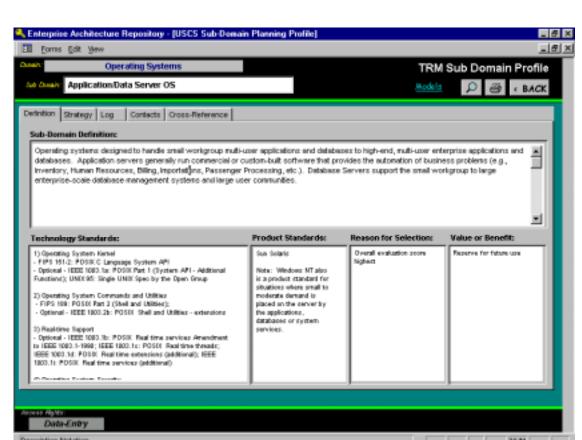


- The Enterprise Infrastructure Platform (TRM) Profile view provides the link to the Technology domains.
- The technology domains are classified under Service Areas, which are groupings of similar domains. In the current scope of the TRM, they are used for easier visualization and management purposes only. The role of the service area will be expanded in the future vision as the solution architects are established.
- The TRM Service Areas for Customs have been structured as shown in the diagram above.
- There are five main Service Areas, each containing groups of related domains.
   The Services Areas are:
  - User Environment
  - Application Services
  - Data Services
  - Integration Services
  - Common Services.

# Infrastructure Platform Profile—TRM Domain Hierarchy

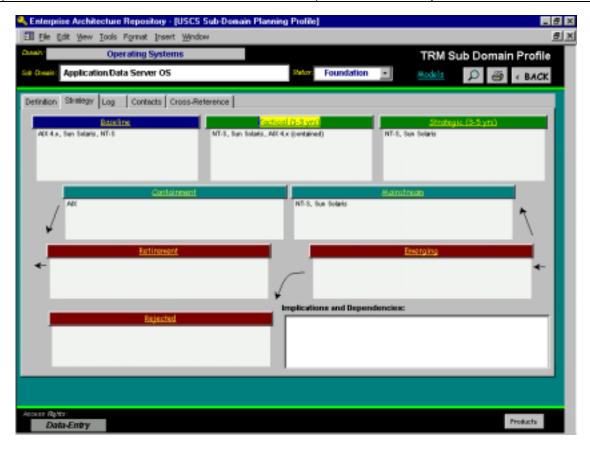


- The TRM Domain Hierarchy shows the sub-domain links within a Technology domain. Also listed next to the sub-domain links is the list of baseline products within the sub-domain.
- Technology Domains are defined as the primary classification level of the technology components of the TRM. There are approximately two dozen different Domains.
- The Sub-Domain is the actual technology category that contains the products, selection criteria, benefits and others topic areas used to make decisions and assess compliance.



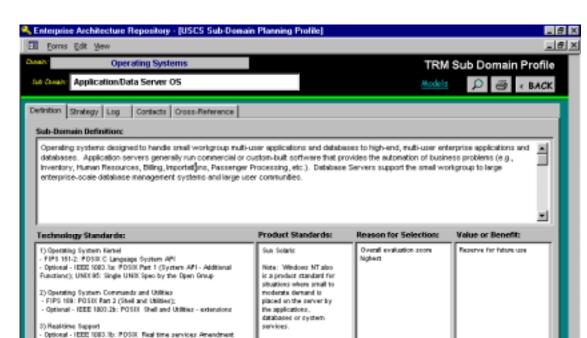
#### Infrastructure Platform Profile—TRM Sub-Domain Profile

- The TRM Sub-Domain profile shows the following attributes for each subdomain-Definition, Strategy, Log, Contacts and Cross-Reference.
- The figure shows the "Definition" form within the TRM Sub-Domain Profile. It includes:
  - Sub-Domain Definition: Represents the specific technology categories to which definitions, standards, product standards, benefits, selection criteria and product planning portfolios are applied.
  - Technology Standards: Technical criteria used to capture the technical and functionality quality of particular types of products.
  - Product Standards: Actual product listings that are defined for the subdomain. This includes all relevant product information (vendor, versions, etc.).
  - Reason for Selection: Key factors and requirements compiled from the information sources.
  - Value or Benefits: Describe the primary advantages of following the Technical and Product Specifications and Selection Criteria listed for the Sub-Domain.



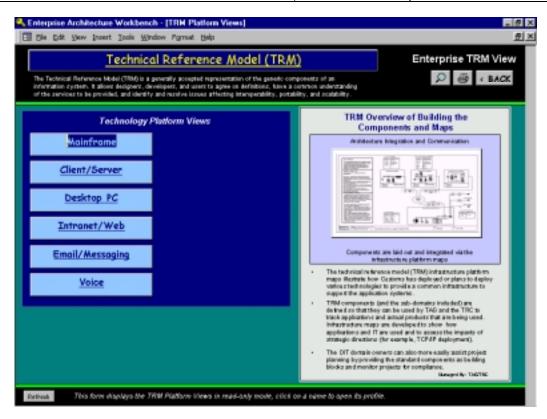
- The figure shows the "Strategy" form within the TRM Sub Domain Profile. The strategy is documented across a framework of planning blocks that represent how Customs has positioned its portfolio of products and technologies resulting from the IT strategic planning process.
- The Sub-Domain Planning Strategy answers the question of how the different products and technologies for a Sub-Domain are being used by Customs. The approved roles for products within Sub-Domains enable the assessment of technical compliance.
- The Technology Planning Horizon shows the strategic direction from the current Baseline environment as compared to where it is going in the short and longerterm future (Baseline, Tactical, and Strategic).
- The Lifecycle for Products shows the evolutionary applicability of the products and technologies (P/Ts) within the Sub-Domain (Emerging, Mainstream, Containment, and Retirement).

to IEEE 1003.1-1998; IEEE 1803.1c; POSSI Resistance threads; IEEE 1003.1d; POSIX Real time extensions (additional); IEEE 1803.1d; POSIX Real time pervious (additional).

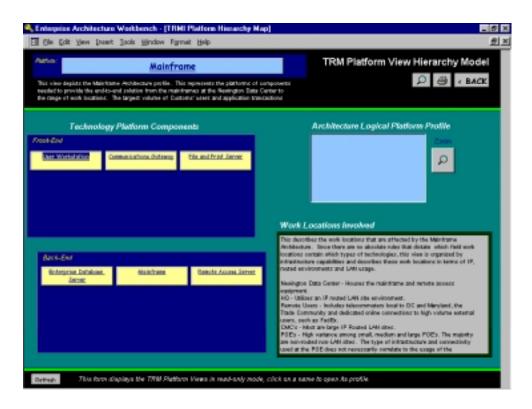


### Infrastructure Platform Profile—TRM Platform Component

- The figure shows the profile of a Platform Component. It includes a definition, the Sub-Domains within and an optional field to indicate if it is mandatory to include the particular Sub-Domain.
- The Components are constructed to represent a set of Sub-Domains that are used together to build a functional component, such as a database server.
   Components make it easier to navigate all the Sub-Domains needed to accomplish a task or build a system.
- These components are especially helpful for new projects that are proposing specific technology architectures (for example, mainframe or client/server architectures) because they provide all the relevant Sub-Domains grouped into complementary building blocks.



- The Platform view shows the six platforms and the links to the components contained within each platform. The six platforms identified at Customs are:
  - Mainframe
  - Client/Server
  - Desktop PC
  - Internet/Web
  - Email/Messaging
  - Voice.



- The individual Platform view indicates the Components that are interconnected on the logical map.
- A component is grouped into one of two categories based on where it deployed:
  - Front-end: Components deployed near the users to provide front-end services.
  - Back-end: Components deployed centrally to provide back-end services.
- A brief description is also provided to describe the work locations that are involved in the platform.

## **TRM Infrastructure Profile Summary**

The following table summarizes the technical reference model hierarchy structure on a Domain basis. It also provides a cross-reference relationship to the infrastructure model platforms that utilize Sub-Domains from the Domain's family tree structure. Three new platform models—intranet/Web, messaging, and voice—are under development and will added to the core set of baseline and target platform views—mainframe, client/server, and desktop.

			Structure	•	F	Platfo	rm A	rchit	ectur	е	
Service Area	Domain	Sub-Domains	Unique Products td entified in portb lios	Platom Components	Mainframe - Centralized	Client Server	Des ktop	htranet/Web	Messaging	Voice	Domain to Platform Cross-Referen
User Environment	Workstations	1	2	1	Х	Х	х	Х	Х		
	Personal Productivity	1	6	1	Х	Х	Х				_
	Analysis Tools	1	2								Sub-Domain status bre
Application Services	Application Development Environment	3	20	2	Х	Х		Х	Х		Foundation = 22
	Workgroup Computing	1	3								Foundation = 22
	Document Management	1	5								<ul> <li>Pillar = 30</li> </ul>
Data Management Services	Database Technologies	4	12	5	Х	х	Х	Х	Х		a Commodity 2
	Data Warehouse	3	7								• Commodity = 3
	Data Management	2	11	2	Х	х		Х			<ul> <li>Proposed = 23</li> </ul>
Integration Services	Middleware	3	9	6	Х	Х		Х	х		• Retired = 45
	Workflow	1	2								• Retired = 45
	Communications (Protocols)	2	10	3	х	Х	Х	х	х	X	
	Interchange	1	1								
Common Services	Network Infrastructure	3	16	6	Х	Х	Х	Х	X	Х	
	Operating Systems	4	12	11	Х	Х	Х	Х	X	X	
	Storage Technologies	1	4								
	Power Management Technologies	1	2								
	Security Technologies	17	23	5	Х	Х	Х	Х	X		
	Infrastructure Management	9	20	3	Х	Х	Х	Х	Х	Х	
	Email/Messaging	3	4	2	Х	Х	Х	Х	X		
	Distributed Computing	2	7								
	Voice Technologies	12	1								
	Application Server	1	3	1		Х		Х			
	Retired Components	45	24								

#### nain to Platform View Cross-Reference

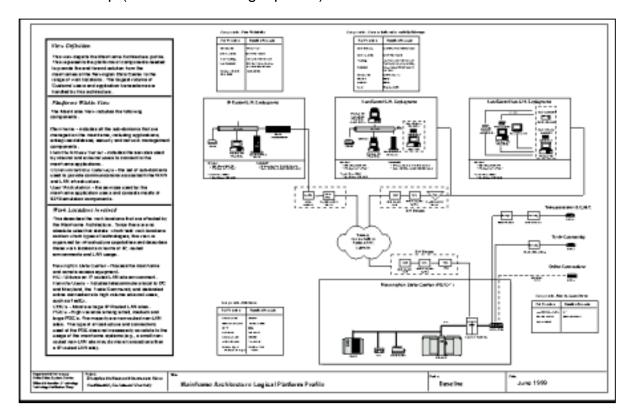
omain status breakdown:

- illar = 30
- ommodity = 3
- roposed = 23
- etired = 45

#### **Logical Infrastructure Platform Profile**

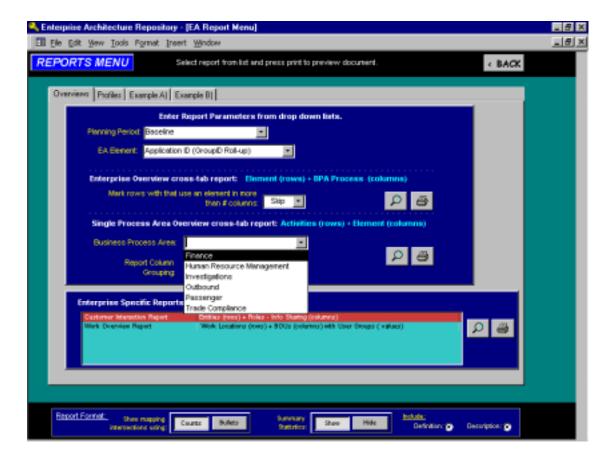
Each platform within the Infrastructure Platform profile is depicted using a Logical Platform profile and includes an Infrastructure map, Definition, Components within platform and Work Locations involved. The logical platform profiles created to-date are:

- Mainframe (Baseline and Target period)
- Client/Server (Baseline and Target period)
- Desktop (Baseline and Target period).



Based on the recent Technical Architecture workshop, Customs is developing the logical platform profiles for three new platforms—Internet/Web, Email/Messaging and Voice.

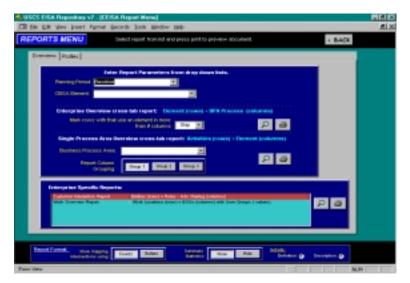
#### **Enterprise Repository: Reporting Environment**



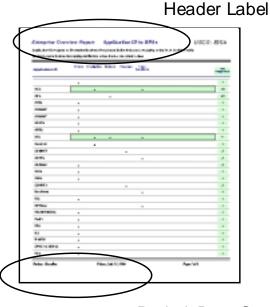
The figure shows the form from where the various content reports can be produced from the enterprise repository. The user can produce a selective or complete set of reports from the report menus.

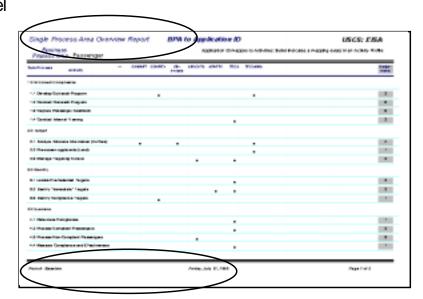
Each report can be published from the Reports Menu in the database application.

(Access97 is required)



Header Label





Period, Date Stamp

Each printed report provides a:

- **HEADER LABEL:** indicating the report name specification
- PERIOD field indicating the planning period from which the data was derived
- DATESTAMP marking when the actual report was printed from the repository

- Optional sections include a **DEFINITION** of the EA element class and/or an individual **DESCRIPTION** of an element value.
- The figure shows a sample report generated from the repository mapping the Work Locations to BPAs.

The mappings can be created using either dots or counts. The right-most column shows the total count. The bottom most row shows the summary statistics.

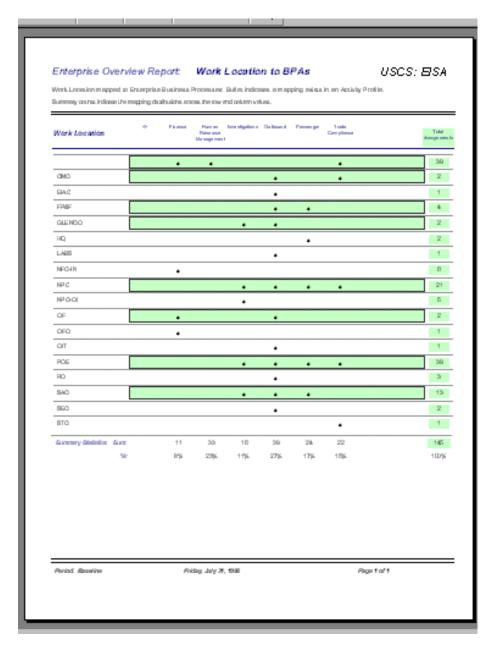


Figure 50: Sample Report

#### **Enterprise Mapping Profile Report Samples**

- (A) Enterprise Element Master List: WORK LOCATION
  - These reports, extracted from the database, present a complete listing of the EA elements that have been identified within Customs for mapping purposes. A Customs working definition of the element is also included in the report header section.
- (B) Process Activity Mapping Profile: PASSENGER
  - The following reports contain the activity mapping profiles that describe the specific relationships used to model the work, functional and information views.
     This report represents the level of information that is maintained by the user.
- (C) Business Process Area Overview Report: PASSENGER@ WORK LOCATION,
  - The following reports illustrate an enterprise summary map of the EA elements that have been mapped into the selected business process areas. Each report highlights process activities (rows) and indicates where an EA element has been mapped into the BPA activity profile.
- (D) Sub-Domain Profile Report:
  - The profile includes the definition of the sub-domain category, standards, product standards, benefits, selection reasoning and the product-planning portfolio that has been developed as part of the OIT strategic plan.
- (E) Platform Profile Report:
  - The profile includes the definition of the platform model, the collection of subdomains/product portfolios that comprise the platform and the I3 reference model designation (i.e. Applicable tiers, environments, and layers)
- (F) Enterprise Overview Reports: WORK LOCATION
  - The following reports illustrate an enterprise summary map of the EA elements that have been mapped into the business process areas. Each report highlights elements (rows) that have been mapped into more than one BPA (columns) as an indication of commonality.
  - A user may further investigate these relationships by either drilling into a specific BPA (report samples are included in Chapter 4) or by browsing the business activity profiles (included in Appendix A). The database includes these capabilities on the Report Menu or Activity profile screens, respectively.

# (G) Business Process Area Work Role Summary Report: PASSENGER

 The following reports illustrate the compiled results of the work role mappings under each the business process areas. These reports provide the context to understand how internal and external organization units participate in the work processes within Customs. A description of the work role classifications is included at the end of each report.

# (H) Business Process Area: Key Information Flow Report: PASSENGER

- The following reports illustrate summary maps of the key information flows that have been mapped on the Customs business processes. The report describes the key information relationships that exist between the BPA activities (rows) and the elements listed at the top of the six columns. The key information is listed at the intersection of the row and column and an arrow indicates the direction of the flow. A description of the flow classifications is included at the end of each report.
- This report is generated from the database repository tool and allows the end user to select up to six elements of interest to be included in the columns. The user selects from a summary list of all the elements (EE, DS, and FA) that have been mapped under a BPA in the business activity profiles.

# **APPENDIX**

# **GLOSSARY OF ACRONYMS**

3GL	Third Congration Language						
4GL	Third-Generation Language						
	Fourth-Generation Language						
ABI	Automated Broker Interface						
ACO	Assistant Commissioner Office						
ACS	Automated Commercial System						
AES	Automated Export System						
ATS-P	Automated Targeting Systems—Passenger						
BA	Business Activity						
BIR	Business Interface Representative						
BITR	Business Information Technology Representative						
BOU	Business Operating Units						
BPI	Business Process Improvement						
BPR	Business Process Re-Engineering						
CABINET	Combined Agency Border Intelligence Network						
CAPPS	Customs Automated Port Profile System						
CIPPS	Customs Integrated Personnel Payroll System						
COTS	Commercial Off-The-Shelf						
CRUD	Create, Retrieve, Update, Delete						
DBMS	Database Management System						
DO	Domain Owner						
DS	Data Stores						
EA	Enterprise Architecture						
EAR	Enterprise Architecture Repository						
EE	External Entities						
FA	Functional Activities						
GAO	General Accounting Office						
GOTS	Government Off-The-Shelf						
IMP	Investment Management Process						
IP	Internet Protocol						
IRB	Investment Review Board						
IRM	Information Resources Management						
IT	Information Technology						
ITC	Information Technology Committee						
ITCD	Information Technology Concept Document						
NCAP							
NUAF	National Customs Automated Prototype						

OF	Office Of Finance
OFO	Office Of Field Operations
OI	Office Of Investigations
OIT	Office Of Information And Technology
OMB	Office Of Management And Budget
00	Object-Oriented
P/Ts	Products And Technologies
PISAP	Process Improvement Strategic Action Plan
RDBMS	Relational Database Management System
SDD	Software Development Division
SDLC	Systems Development Life Cycle
SME	Subject Matter Expert
SPA	Strategic Planning Activity
SPP	Software Process Improvement Plan
SPS	Strategic Problem Solving
TA	Technical Architecture
TADG	Treasury Architecture Development Guidance
TADP	Treasury Architecture Development Process
TAG	Technical Architecture Group
TAWG	Treasury Architecture Working Group
TCO	Total Cost Of Ownership
TCP/IP	Transmission Control Protocol/Internet Protocol
TISAF	Treasury Information Systems Architecture Framework
TRC	Technology Review Committee
TRM	Technical Reference Model
UPS	Uninterruptible Power Supply
USCS	United Stated Customs Service
WAG	Web Architecture Group
WL	Work Locations

# **Proposing Changes to this Document**

This section provides guidance for submission of proposed changes to any Customs EA documents.

Each proposal should be described as specific wording for line-in/line-out changes to a specific part of the document. Use of a standard format for submitting a change proposal will expedite the processing of changes.

The preferred method of proposal receipt is via electronic mail. It is requested that change proposals be sent in ASCII format and be sent via the internet to the address below.

Technology and Architecture Group (TAG)	Internet:	Phone:	<u>Fax:</u>
Rob C. Thomas II	Rob.C.Thomas@customs.treas.gov	703-921-6417	703-921-6046

The format for submitting change proposals is as follows:

#### Point of Contact Identification

- 1. Name
- 2. Organization and Office Symbol
- 3. Street
- 4. Citv
- 5. State
- 6. Zip Code
- 7. Area Code and Telephone No.
- 8. Area Code and Fax No.
- 9. Electronic Mail Address

#### **Proposed Changes**

- 1. Document Name
- 2. Section Number
- 3. Page Number
- 4. Title of Proposed Change
- 5. Wording of Proposed Change
- 6. Rationale for Proposed Change
- 7. Other Comments

Please repeat items (1) through (6) for each proposed change.

The Document Name, Section Number and Page Number fields allow the submitter to clearly identify where the proposed change should be made. The Title of the Proposed Change field is for the submitter to insert a brief title that gives a general indication of the nature of the proposed change. In the Wording of the Proposed Change field, the submitter should identify the specific words (or sentences) to be deleted and the exact words (or sentences) to be inserted. In this field, providing identification of the referenced section as well as the affected sentence(s) in that section would be helpful.

The goal is for the commentator to provide proposed wording that is appropriate for insertion into the document without editing (i.e., a line-in/line-out change). The Rationale for the Proposed Change allows the commentator to provide additional commentary and support for making the proposed change. The more specific the rationale, the more likely the proposed change will be accepted. A statement concerning the impact of the proposed change may also be included in the rationale. Finally, any other information the commentator wishes to provide may be included in the Other Comments field. However, without some degree of specificity, these comments may not result in change to the document.